

Vanderhoof Defined Forest Area

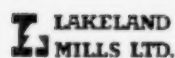
Sustainable Forest Management Plan

Version 1.0 - July 29, 2005



Vanderhoof Sustainable Forest Management Plan

Vanderhoof Licensee Team
Vanderhoof DFA



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VERSION 1.0 - July 29, 2005

SUSTAINABLE FOREST MANAGEMENT PLAN

VANDERHOOF DFA

Canadian Forest Products Ltd.

Lakeland Mills Ltd.

L&M Lumber Ltd.

BC Timber Sales (BCTS)

We are pleased to present this Sustainable Forest Management Plan on behalf of the Vanderhoof DFA Licensee Team.

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VERSION 1.0 - JULY 29, 2005

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Preamble

This Sustainable Forest Management Plan (SFMP) is an initiative of four of the major licensees that operate within the Vanderhoof Forest District. These licensees have come together to formulate the Vanderhoof SFMP Licensee Team and are the major signatories of this plan. The Licensee Team is comprised of:

- Canadian Forest Products Ltd. (Vanderhoof Division)
- Lakeland Mills Ltd. (Vanderhoof Operations)
- L&M Lumber Ltd.
- BC Timber Sales (BCTS), Stuart-Nechako Business Area

The following describes the commitments of Sustainable Forest Management (SFM) for the Vanderhoof Defined Forest Area (DFA), developed by the Vanderhoof SFMP Licensee Team, endorsed and adhered to by the signatories of this plan. These commitments are available and communicated publicly.

The Vanderhoof Licensee Team believes in conducting business in a manner that protects the environment and ensures sustainable forest development. We are committed to a process that continually improves our activities involving environmental performance and stewardship. To achieve this objective, we must and will:

- **Develop** and **maintain** a scientifically credible, structured, yet flexible framework for SFM at the management unit level that incorporates strategic level requirements.
- **Manage** all operations to comply with or exceed all legal requirements.
- **Encourage** local First Nations to become involved in the development of local SFMPs and resulting operations, while respecting their rights and interests.
- **Provide** opportunities for communities, environmental groups and scientists to participate in planning and implementation in ways that reflect their interests and concerns efficiently in both time and cost and in ways that are effective for both stakeholders and resource managers.
- **Identify, evaluate** and **control** potential environmental risks and implement appropriate preventative measures.
- **Communicate, inform** and **promote** awareness regarding environmental activities with employees, First Nations and stakeholders.
- **Develop** and **maintain** a monitoring program accompanied by evaluation and reporting of findings and feedback into decision making that is designed to evaluate and report on the measures of sustainability.
- **Integrate** an adaptive management system that incorporates improved knowledge, monitoring of results and advances in SFM science and technology so that future plans and practices will continue to move towards sustainability of social, ecological and economic values.
- **Commit** to evolving processes that will ensure work site health and safety standards provide conditions and safeguards for the health and safety of employees and the public.
- **Conduct** timely audits of environmental management systems and SFM parameters, and implement corrective measures as required.

The success of Sustainable Forest Management within the Vanderhoof DFA is dependent on the performance of each licensee and their commitment to the strategies within this SFMP and other forest management plans.

1.0 Introduction

Sustainability of the forest resource for future use and value is the primary objective of a Sustainable Forest Management Plan (SFMP or SFM plan). The Vanderhoof SFMP will provide local licensees operating within the Vanderhoof Defined Forest Area (DFA) a formal plan that will enable them to achieve SFM and pursue CSA certification to the CSA Z809-02 standard.

This SFMP begins with a background of SFM and a section defining the purpose of this SFMP for the Vanderhoof Licensee Team. Following these introductory sections, the plan continues with a description of the Vanderhoof DFA, including a description of the area, discussions about natural disturbance types and the mountain pine beetle epidemic, and the various resource users present in the DFA. The next section discusses the development of the SFMP, including responsibility and supporting information used in development. An in-depth section describing the measures of the SFM criteria and indicators (C&I) occurs after the plan development section. Each measure is described in its current state and its forecasted future state along with methods of monitoring and analysis. The SFMP is concluded with a section on adaptive management and its importance to the success of this plan and SFM as a whole. Extensive appendices, tables and figures are also included in the plan to help describe and define proposed management strategies, monitoring plans and reporting procedures.

The Vanderhoof Licensee Team SFMP is a working document and will be continually updated and expanded as future forestry practices and socio-economic values associated with the forest resource change over time.

1.1 Background

Throughout the world, forest management has been moving steadily toward a multi-value approach to sustainable development. International agreements and legally binding documents (e.g. United Nations Conference on Environment and Development, Agenda 21, The International Convention on Forests) demonstrate that socio-economic and environmental forestry related issues remain high on the international agenda (Jeakins et. al 2004). These agreements also imply that instruments to address forest values in a balanced and comprehensive manner are needed (Rousseau 1998 in Jeakins et. al 2004). The concept of Sustainable Forest Management (SFM) calls for a much wider set of ecological, economic and social values that must be integrated into operational decision making (Jeakins et. al 2004). It also requires accountability measures and detailed action plans that will account for future as well as present forest resource needs.

In addition, the SFM concept has attracted the attention of consumers, who are increasingly demanding that the products they purchase be derived from forests that are managed on a sustainable basis. Forest certification has emerged as a dominant factor in the forest industry in order to provide assurances to the public that forest management meets certain standards that are considered critical in order to sustain forest resources. The individual companies that make up the Licensee Team sell the majority of their forest products in the global marketplace. Independent, third party certification of a company's forest management practices is rapidly becoming a requirement for continued access to key world markets. The Vanderhoof area SFM plan forms an important forest sustainability planning system that will assist in addressing CSA certification requirements.

The Vanderhoof SFM plan uses locally developed criteria and indicators (C&I) as a vehicle to recommend changes to forest management policy, contribute to national initiatives around

sustainable management of forest resources, focus funding and staff time, and assist with the development of certification plans. The overall objective of the plan process has been to demonstrate to government and industry managers, area residents, stakeholders, First Nations and consumers of forest resources that it is possible to implement SFM at the management unit level. Development of a collaborative SFMP, with continued use of existing operational plans, will lead to efficiencies for both government and industry, as well as increase the public's confidence in forest management.

1.2 Purpose

The SFMP for the Vanderhoof DFA is being developed in order to provide an intensive planning document that will localize SFM indicators and translate concepts and ideologies into working initiatives. The SFMP provides the "on the ground" implementation of locally developed C&I, thereby addressing a range of ecological, economic and social issues for the DFA.

As well, the SFMP provides a structure that allows the forest manager to link strategic level goals and objectives to tactical level approaches that will apply to forest management's changing values and conditions. Strategic level planning involves a large land base and a long-term time frame. Tactical level planning is derived from the strategic level and focuses on a smaller planning area and shorter time frames. The last phase of this hierarchical model is the operational level, involving individual sites and short-term horizons. If the hierarchical model is executed properly, the approach encourages resource managers to organize information for discrete management levels, supporting each level of management to be more efficient and integrated. Levels are defined temporally and spatially where the scope of the higher level fully encompasses the scope of the lower level (Connelly 1996). The Vanderhoof SFMP provides the forest manager with a process to implement management strategies, measure their response and initiate necessary changes to practices through adaptive management. This will continually improve on decisions, practices and on the ground results for a wide range of values, and implement an overall philosophy of good forest management.

The Licensee Team's collaborative SFMP will provide direction and links to government policy and licensee business plans. Some of the expected outcomes once this SFMP is implemented include:

- continual movement towards sustainable management of a set of indicators and measures endorsed by the public
- development of local initiatives and management strategies,
- involvement of First Nations in ways that reflect their preferences and interests,
- marketplace recognition,
- a foundation for a range of certification approaches,
- a source of credible information for requesting unit specific management objectives to improve economic efficiencies,
- acceptance of innovative, cost-effective practices by government decision makers, and easy implementation of practices by forest managers due to science based approaches and information,
- efficient involvement of stakeholders in ways that reflect their interests and capacity,
- opportunities to provide for testing and implementation of the LRMP process, and
- improved transition and implementation of the new provincial Forest and Range Practices Act.

2.0 The Defined Forest Area

Forest management plans are generally written for a specified area based on various factors determined by the nature of the plan. A Defined Forest Area (DFA) is defined in this plan as a specified area of forest, including land, water and range, to which the SFMP is applied (refer to VSFMP PAG Glossary in Appendix II). This plan defines the Vanderhoof DFA as the Crown Forest land base that comprises the Vanderhoof Forest District as defined by the Ministry of Forests (refer to Figure 1), excluding woodlots and private land.

The members of the Licensee Team all operate within the Vanderhoof Forest District, which makes it an ideal DFA for this SFMP. Features of the Vanderhoof DFA including a description of management responsibility, an area description, discussion surrounding natural disturbance types and mountain pine beetle, and various interest groups are detailed in the following subsections.

2.1 Non-signatories and Non-replaceable Forest Licences

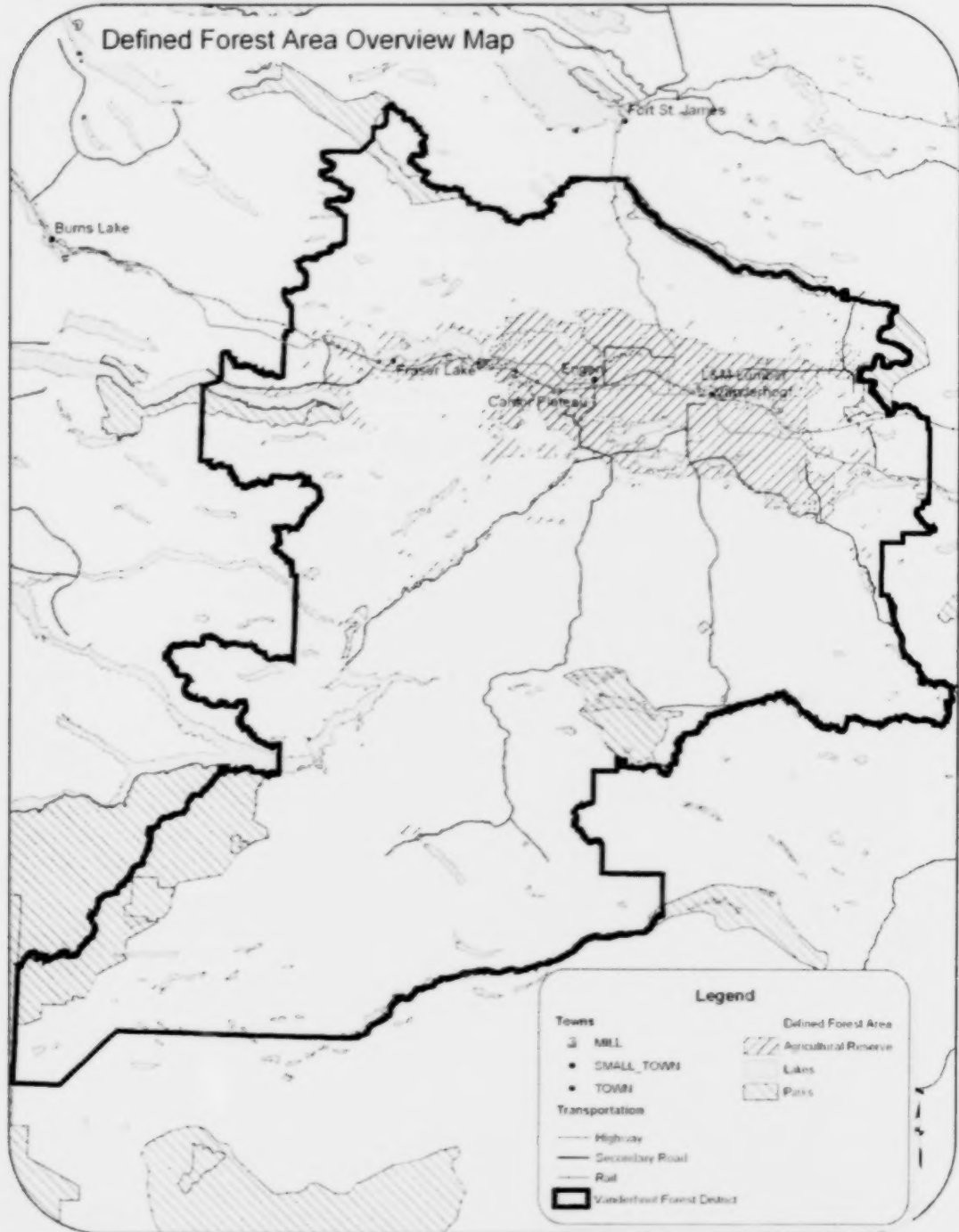
This SFMP was designed as a collaborative effort among certain Licence holders within the Vanderhoof Forest District. The primary Licence type within the DFA is a volume-based Forest tenure. Under these tenure types, operations can and do occur across the Vanderhoof Forest District. Therefore, to provide continuity for industry planning processes and public participation, the entire district was included as the DFA for this plan. Fraser Lake Sawmills (West Fraser) and holders of Non-replaceable Forest Licences (NRFLs) administered by the Ministry of Forests will not be signatories to this SFMP at this time. However, these forest operations may be managed under other sustainable forestry initiatives. Efforts will be made by the Licensee Team to bring these other Licence holders on board with the SFMP, at the very least with these Licensees supplying data relevant to achievement of DFA targets. Licensee Team members are committed to working with non-signatory Licence holders in conjunction with this plan in order to ensure SFM is achieved across the DFA.

It is anticipated that NRFLs will continue to be awarded in 2005/2006. The Licensee Team recognizes that these Licences may have an impact on certain measures of SFM within this plan. At this time, these impacts are still uncertain and it is difficult to address the influences of additional Licences based on current knowledge gaps. As the AAC increase and the addition of new Licences develops within the Vanderhoof Forest District, this SFMP will also be re-visited and updated accordingly in order to continually evolve with district and provincial initiatives. In response to additional Licences within the DFA, the Licensee Team may consider revising existing measures, developing additional measures or dropping current measures as required to uphold the principles of SFM.

2.2 Biophysical Description

The Vanderhoof DFA is located on the North Central Interior Plateau at the geographical center of British Columbia. The overall landscape is relatively flat with several low and rolling areas of topography due to a number of river valleys. Several lower mountain ranges are also present throughout the DFA, such as the Fawnie and Nechako ranges, Jerryboy and Tatuk Hills, and Greer and Fraser Mountains (LRMP 1997). In the north west portion of the DFA, the topography is more structured, including the mountain ranges Ormand, Shass and Peta that continue on into the Lakes and Fort St. James Forest Districts.

Figure 1. Vanderhoof Defined Forest Area (DFA)



Forest cover within the DFA consists mainly of lodgepole pine and spruce stands with scattered patches of aspen, fir, tamarack and birch (LRMP 1997). Lodgepole pine is the predominant tree species (82%) and provides the majority of the commercial forest stands. Douglas-fir leading stands are sparsely scattered across the DFA, and primarily occur in the eastern portion. These stands are unique due to the fact that the Vanderhoof and Fort St. James Forest Districts are the northern most extent of Douglas-fir's natural range (LRMP 1997). Higher elevations within the DFA also have occasional small groves of Engelmann spruce and sub-alpine fir.

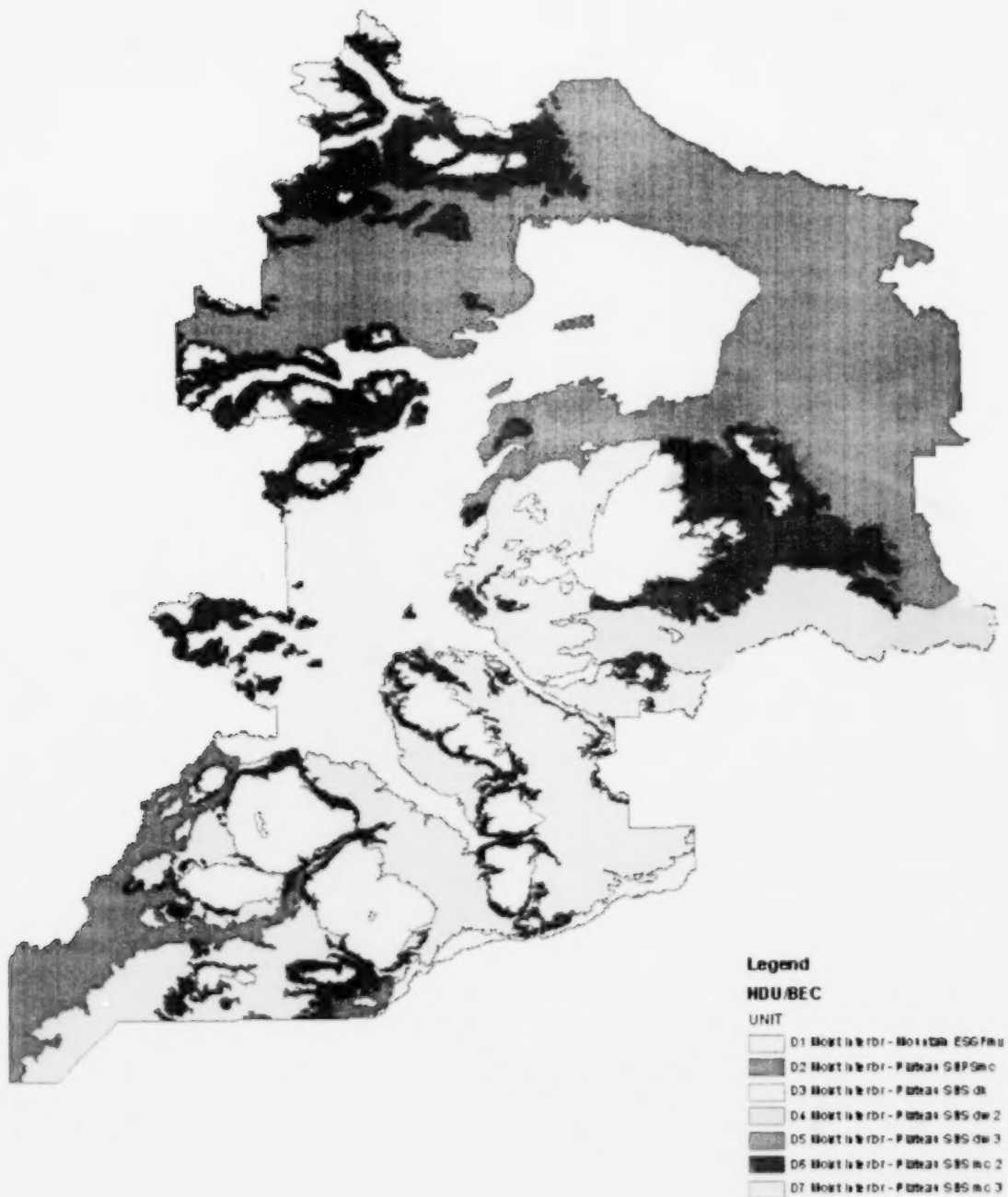
The DFA is 1,387,263 hectares in total land area and of this total, 777,729 hectares are within the Timber Harvesting Land Base (THLB). Vanderhoof's Land and Resource Management Plan (LRMP) (1997) describes land areas called ecosections, which are distinct geographic areas that have been classified based on land-form and climate. The DFA of this SFMP contains four of these ecosections including the Babine Upland, the Nechako Lowland, the Bulkley Basin and the Nazko upland. The Vanderhoof DFA is also contained within two Natural Disturbance Units (NDUs) and eight biogeoclimatic ecosystem classification (BEC) subzones (refer to Figure 2), which are landscape level classifications based on natural disturbance type and ecosystem respectively. A diverse range of vegetation, wildlife and habitat exists throughout the DFA and these classifications will help to streamline management activities based on the natural landscape and environmental condition.

As part of the Protected Areas Strategy implemented by the government of British Columbia, six protected areas were established within the Vanderhoof DFA through the 1997 LRMP process. Four of these protected areas have been designated as Class 'A' Parks, while the remaining two are established Protected Areas and will be designated as Class 'A' Parks in the future. Parks and Protected Areas form approximately 6.8% of the DFA forested land base and are excluded from the THLB, and subsequently from timber harvest activities.

2.3 Natural Disturbance

The land base of British Columbia has historically been divided into various, smaller management units in order to focus management activities and strategies on a more specific basis. These land base divisions grouped areas according to identified similarities, such as grouping by ecosystem type in biogeoclimatic classification divisions. As research and technology advance in the field of forestry, land classifications and divisions continue to evolve. The science of natural disturbance unit classification is the most recent scientific viewpoint with regards to management of British Columbia's forests. As referenced by Craig DeLong (2002), the underlying assumption of natural disturbance unit classification is that the biota of a forest is adapted to the conditions created by natural disturbances. Therefore, coping with the ecological changes associated with forest management activities should be easier if the pattern and structure created resembles those of natural disturbance.

Figure 2. Natural Disturbance Units and Biogeoclimatic Ecosystem Classification in the DFA



Natural disturbance is defined in this SFMP as the historic process of fire, insects, wind, landslides, and other natural events in an area that were not caused by humans (refer to VSFMP PAG Glossary, Appendix II). Nine Natural Disturbance Units (NDUs) have been identified in British Columbia based on a combination of differences in disturbance process, stand development, and temporal and spatial landscape pattern (DeLong 2002). Of these nine units, only the Moist Interior NDU is present within the Vanderhoof DFA. However, this NDU is subdivided into the Moist Interior Plateau and the Moist Interior Mountain sub-units based on significant differences in elevation (DeLong 2002). Fire and mountain pine beetle are the key stand replacement disturbance events operating within the Moist Interior Plateau NDU (DeLong 2002). However, DeLong (2002) also notes that there is no documented evidence that mountain pine beetle played a major role as a stand replacement agent prior to fire control. Fire suppression activities, from a natural disturbance perspective, actually interrupted natural cycles. Due to the absence of a natural disturbance event, a large supply of viable host for the mountain pine beetle was made available throughout most of the DFA.

2.3.1 Mountain Pine Beetle

Bark beetles such as the mountain pine beetle (*Dendroctonus ponderosae*) are a natural part of forest ecosystems across British Columbia, provided a host is present. One of the tree species susceptible to mountain pine beetle infestation is lodgepole pine. As mentioned, the Vanderhoof DFA was historically maintained by large-scale fire events that produced widespread, homogeneous forest stands of lodgepole pine. Fire suppression activities resulted in large tracts of pure pine hosts across the DFA for mountain pine beetles to infest. In the recent past, cold winter weather occurring during late October and November kept mountain pine beetle populations relatively controlled, even with an abundance of host. However, over the last decade, warmer weather patterns have developed, allowing pine beetle populations to explode, thereby causing an overall epidemic to interior pine forests.

The Vanderhoof Forest District, which encompasses the DFA of this SFMP, has been designated an Emergency Bark Beetle Management Unit under the *Bark Beetle Regulation* of the Forest Practices Code of British Columbia Act. The Ministry of Forest's mountain pine beetle overview survey information indicates that the rate of expansion of the infestation from 2001 to 2003 is estimated at 3.1 times per year. The exponential spread is affecting both current and future timber supply as well as the aesthetic qualities associated with the forested landscapes within the DFA. One of the primary industrial concerns with the mountain pine beetle epidemic involves the utilization of infested timber. If beetle wood is not harvested soon after infestation, it will progressively deteriorate and eventually become unsuitable for use in lumber manufacturing. Intensive management regimes have helped to increase harvest levels, increase access throughout the DFA, and to increase overall forestry activity in and around the district. However, goals of SFM involve a sustainable forest resource and a diversity of resource uses to maintain and even stimulate the local economy. Through the SFMP, management strategies will be developed and implemented to attempt to reduce the impacts of the pine beetle epidemic and promptly return damaged stands to productive forest. The Vanderhoof SFMP will focus on management regimes that will allow for beetle management within the realm of sustainability and overall health of the forest resource.

2.4 Interest Groups

Current population within the Vanderhoof DFA is approximately 7,000 people (Statistics Canada 1996). This base is made up of the municipality of Vanderhoof (4470 people), the village of Fraser Lake (1344 people), the community of Fort Fraser (377 people), and the First Nations communities of Nadleh Whut'en (188 people), Saik'uz (382 people), and Stelat'en (166 people).

Rural populations also surround these communities and exist scattered throughout the backcountry of the DFA. This population base leads to a variety of interest groups and resource values derived from the forests within the Vanderhoof DFA. The Licensee Team has reviewed forest management processes and initiatives that are in the process of being developed, or currently exist, adjacent to the DFA. This SFMP has attempted to incorporate similarities between landscape level strategies where possible and annual reports pertaining to the Vanderhoof SFMP will be made available to adjacent jurisdictions for future reference and planning of forest resources.

2.4.1 Industry

Forestry is the leading natural resource based industry within the DFA. Approximately 39% of all jobs within the Vanderhoof Forest District are derived from forestry (LRMP 1997). Therefore, communities within the DFA are directly dependent upon the forest industry as it creates nearly 2000 full time equivalent, direct jobs (Vanderhoof IFPA 2000). Forestry employment exists in the form of silviculture activities, harvesting operations, planning and management, and mill-related employment, including a major portion of primary and value-added manufacturing. The DFA contains three active sawmills and several value-added operations, such as Vanderhoof Specialty Woods, Rocky Mountain Log Homes and Premium Pellet. There are also currently twenty-three Woodlot Licence operators and twenty-six logging contractors that service the various mills within the DFA. Considerable indirect forest industry employment is also generated through trucking, machinery repair and other support services.

The Vanderhoof DFA historically had an annual harvest level of 1.965 million cubic meters, or approximately 20% of the Prince George TSA AAC (Vanderhoof IFPA 2000). Currently, the district has an annual harvest level of 5.490 million cubic meters per year (BC MOF 2004b) based on recent uplifts due to action around mountain pine beetle infested timber. Most of the new Licences introduced into the DFA are short term tenures, and once the beetle issues have been mitigated, the district will likely resume with cut levels that more closely resemble historical levels. The current cut volume in the DFA is a combination of original district cut, mountain pine beetle uplift and transfer volume, and IFPA uplift volume. Both the beetle uplift and the IFPA uplift was distributed to a number of licensees operating in the Vanderhoof Forest District including, but not limited to, Canfor, Lakeland Mills, West Fraser and L&M Lumber. The combined AAC volumes as percentages of the total AAC apportionment to the DFA by the Minister of Forests are as follows (BC MOF 2004b):

Table 1. AAC Apportionment, Historical and Current – Vanderhoof Forest District

Apportionment by Licensee	Percent of Total AAC (1.965 M m3)	Percent of Total AAC (5.490 M m3)
Canfor: FL A40873, FL A18165, FL A18157	45.9%	30.7%
West Fraser: FL A18162, <i>FL A70865, FL A70864, FL A16830, FL A16827, FL A16826</i>	14.6%	22.8%
L&M Lumber: FL A55578, FL A17842	17.6%	7.2%
Lakeland Mills: FL A18163	0.8%	0.8%
BCTS	21.1%	19.6%
<i>Interim Measures Agreements</i>	0%	12.0%
<i>Other Licence Holders (i.e. SNRFL)</i>	0%	6.9%
TOTAL	100%	100.0%

*italicized values are new Licences in the Vanderhoof DFA due to beetle uplift and transfer volumes

Agriculture is the second largest resource industry within the DFA, with 470 farms and ranches spanning across the Vanderhoof DFA (Vanderhoof IFPA 2000). Agriculture and farming account for 11% of the local jobs, as the Nechako Valley is the third largest agriculture region and the second largest forage-producing region in the province of British Columbia. The agriculture industry is inter-connected with the forest industry within the DFA as grazing values for livestock exist throughout the forested regions. The Vanderhoof DFA contains nearly 250,000 hectares of Crown range. As such, the land base must be co-managed by both industries.

Mineral exploration is also present within the DFA, including industrial mining of coal, gold, silver, molybdenum, and several other minerals. Exploration, site development and active mining practices are ongoing activities within the DFA depending on markets and economic viability in extraction of the particular resource.

Communities within the DFA are highly dependent on each of the above mentioned industries and, therefore, the overall abundance of natural resources supplied from the DFA. Due to this high dependence on natural resources, sustainability and proper management should be a primary interest of each resource-based industry. Planning tools such as this SFMP will help to ensure a healthy, sustainable future for forestry and the employment generated through the forest industry.

2.4.2 First Nations

A long history of habitation by First Nations exists within the Vanderhoof DFA and the current land base contains an abundance of archaeological and cultural sites relating to past and present use by Aboriginal people. The First Nations villages of Stellat'en, Nadleh Whut'en and Saik'uz are all located within the Vanderhoof DFA, and several other First Nation villages have overlapping interests that also fall within the DFA boundary (see Table 2). Fishing and hunting on traditional territories and identification and protection of cultural sites are ongoing activities throughout the DFA. It is important for First Nations to have the opportunity to provide input into management initiatives and planning strategies developed for the DFA, such as this SFMP, as many cultural sites and features have not been formally identified.

Table 2. Local First Nation Communities and General Locations

First Nation Community	Geographic Location
Cheslatta Carrier	Fraser Lake south area
Lheidli T'enneh	east Vanderhoof area
Nazko	Bobtail area
Nadleh Whut'en	Nautley, Fraser Lake area
Nak'azdli	north Vanderhoof area
Saik'uz	Stoney Creek, central Vanderhoof area
Stellat'en	Stellako, Fraser Lake area
Tl'azt'en	north Vanderhoof area
Ulkatcho	south Vanderhoof area
Lhooks'uz Dene	south Vanderhoof area
Yekooche	north Vanderhoof area

Conservation of historical and cultural features within the DFA is important, as is the involvement of First Nations people in management decisions, in order to promote a sustainable forest management for the Vanderhoof DFA.

2.4.3 Recreation/Tourism

Recreation opportunities involve an increasingly important interest group within the Vanderhoof DFA. Local residents and commercial tourism ventures through guiding and outfitting, and commercial lodges and resorts both make use of the extensive backcountry and wilderness values present within the DFA. Recreation and wilderness opportunities have inherently caused an increase in tourism in the DFA, as it was expected that by 2003, visits to British Columbia forest lands would be over 70 million, thousands of which would be in the Vanderhoof DFA (Vanderhoof IFPA 2000).

There are approximately 12,000 kilometers of forest road (refer to Table 15) within the DFA that provides access for forest management, but also provides public access to many popular summer and winter recreation destinations. Forest Service recreation sites, campgrounds and access to rugged hiking opportunities along rivers, lakes and streams are some of the recreation opportunities available to the public due to the extensive forest road system in the Vanderhoof DFA. Major river systems within the DFA include the Nechako, Stuart, Sutherland, Blackwater, Chilako and Entiako. Each of the river systems supports spawning runs of salmon, steelhead and other fish species, and both the Blackwater and the Entiako rivers are world-class sport fishing rivers (Vanderhoof IFPA 2000).

Various wildlife species are present within the Vanderhoof DFA, which also helps to enhance the recreation and tourism potential for the area. Moose are abundant in the low-lying wetlands and open forests, deer thrive throughout the entire DFA, elk often winter next to areas of the Nechako River, and Woodland caribou have been identified in the southwest portion of the DFA near Tweedsmuir Provincial Park. Wolves, grizzly bears, black bears, cougars, bobcats and lynx are also present throughout the DFA. Coyotes and various fox species are abundant, along with smaller mammals such as rabbits, squirrels, beavers, otters, marten and fisher. Many varieties of songbirds, upland game birds, waterfowl and larger birds such as owls, eagles and falcons are also present and plentiful throughout the DFA.

The variety of wildlife is an important factor for recreation and tourism in that wildlife often attract many visitors as viewing wildlife is part of the wilderness experience. Commercial tourism through lodges, resorts and wilderness adventure experiences, hunting guiding and trapping is another part of recreation and tourism that is dependent on wildlife populations and is a growing venture within the Vanderhoof DFA. These users along with other members of the public, forest licensees, and other interest groups must achieve sustainable and integrated management of the forest resource in order to satisfy all their values. Proper management and forest planning with consideration of all parties will assist in the conservation and enhancement of recreational values for current and future forest use.

3.0 Developing the SFMP

The primary purpose of this SFMP is to outline how the Licensee Team will conduct operations in order to meet the goals of SFM. The Vanderhoof SFMP will also serve as a tool for licensees to use in their pursuit of certification under the CSA Z809-02 standard. One of the primary requirements of the CSA standard is inclusion of public opinion to the development and implementation strategy of the plan. This section describes the various groups responsible for the plan, including the public and the public participation process, along with a description of the documents and information used to develop the Vanderhoof SFMP.

3.1 Responsibility

The organizational structure for the development and implementation of the Vanderhoof SFMP consists of the Vanderhoof SFM plan Licensee Team, the Vanderhoof SFM Public Advisory Group (PAG), and local First Nations. The Licensee Team is formed of local, forest industry company representatives who will also be the signatories to the final plan. Along with the expertise of the Licensee Team, consultation with members of the public through the PAG, and with First Nations, will help to create a SFMP that encourages acceptable and effective strategies and practices toward achieving SFM.

3.1.1 Signatories

With current trends towards SFM certification, several licensees operating under volume based tenure within the Vanderhoof Forest District, joined forces to develop a cooperative SFMP for the Vanderhoof DFA. This collaborative plan encompasses the Vanderhoof Forest District, including each licensee's operating area, and will serve to assist participating licensees as they move toward SFM within the DFA. Each party that is signatory to the plan is committed to the development, implementation and maintenance of this SFMP within the Vanderhoof DFA. The signatories to the plan include:

- Canadian Forest Products Ltd.
- Lakeland Mills Ltd.
- L&M Lumber Ltd.
- BC Timber Sales, Stuart-Nechako Business Area

Individual company initiatives that are currently part of operations will be an important part of the overall SFM strategy. While this SFMP is the primary document that will be used to guide an individual company's implementation of SFM, other existing management systems (i.e. ISO 14001 EMS), Standard Operating Procedures and internal policies will also play a role. These items will need to be re-visited to ensure compliance and conformance with the required standard if certification is the ultimate goal. Details on the signatories to this SFMP are included below.

3.1.1.1 Canadian Forest Products Ltd.

Canfor Corporation is a leading Canadian integrated forest products company with head offices based in Vancouver, BC. With the recent integration of Canadian Forest Products and Slocan Forest Products, Canfor now has woodlands operations throughout most of BC, including Vanderhoof, and also operations in Alberta, Quebec and Washington. Canfor Corporation is listed on the Toronto stock exchange with the main operating company as Canadian Forest Products Ltd., from which the name Canfor is derived. Products produced and sold in global markets include lumber, bleached kraft pulp, semi-bleached and unbleached kraft paper, oriented strand board, plywood, veneer and remanufactured lumber products.

Canfor operates two facilities that have operating areas within the Vanderhoof DFA. These include the Plateau and Isle Pierre sawmills. Both mills are located just off of highway 16 with the Plateau Division being approximately 20 km west of Vanderhoof and the Isle Pierre Division approximately 50 km east of Vanderhoof. Canfor's operations in the Vanderhoof DFA consume approximately 2.5 million cubic meters of coniferous timber annually. The primary sources of this timber are from renewable Forest Licenses (59%) and purchases (41%).

The Woodlands operations of both Plateau and Isle Pierre are certified by ISO 14001 for environmental management. The Isle Pierre operation also has SFI certification. Certification options for both facilities are currently under review. The following is Canfor Vanderhoof's Sustainable Forest Management Policy.



SFM Policy – Canfor Vanderhoof

Canfor Vanderhoof believes in conducting business in a manner that protects the environment and ensures sustainable forest development. We are committed to a process that continually improves our activities involving environmental performance and stewardship. To achieve this objective, we must and will:

- **Develop** and **maintain** a scientifically credible, structured, yet flexible framework for SFM at the management unit level that incorporates strategic level requirements.
- **Manage** all operations to comply with or exceed all legal requirements.
- **Encourage** local First Nations to become involved in the development of local SFMPs and resulting operations, while respecting their rights and interests.
- **Provide** opportunities for communities, environmental groups and scientists to participate in planning and implementation in ways that reflect their interests and concerns efficiently in both time and cost and in ways that are effective for both stakeholders and resource managers.
- **Identify, evaluate** and **control** potential environmental risks and implement appropriate preventative measures.
- **Communicate, inform** and **promote** awareness regarding environmental activities with employees, First Nations and stakeholders.
- **Develop** and **maintain** a monitoring program accompanied by evaluation and reporting of findings and feedback into decision making that is designed to evaluate and report on the measures of sustainability.
- **Integrate** an adaptive management system that incorporates improved knowledge, monitoring of results and advances in SFM science and technology so that future plans and practices will continue to move towards sustainability of social, ecological and economic values.
- **Commit** to evolving processes that will ensure work site health and safety standards provide conditions and safeguards for the health and safety of employees and the public.
- **Conduct** timely audits of environmental management systems and SFM parameters, and implement corrective measures as required.

3.1.1.2 Lakeland Mills Ltd.

Five Prince George residents started Lakeland Mills Ltd. in 1963 with the construction of a sawmill in the Canadian National Railway Industrial Park. From 1973 until the early 1990's Lakeland Mills Ltd. was owned and operated by three local residents, Ivan Andersen, George Killy and Bob Stewart. Lakeland's current president is Keith Andersen and Bill Stewart sits on the board of directors. Local ownership of Lakeland Mills results in responsible decisions being made with a thorough understanding of their impact on the Prince George area. In addition to running their forest products business, the owners of Lakeland are also involved in community affairs, both by serving on committees and by providing financial assistance to worthwhile community projects.

Lakeland Mills Ltd. operates a sawmill and planer complex near the confluence of the Nechako and Fraser Rivers in Prince George, BC. Since 1973 the manufacturing facilities have undergone many upgrades. The company policy has been to recover the greatest value possible from each log. The most significant upgrade occurred in 1980-81 when the current sawmill was brought into production. The new mill had a lumber recovery of approximately 50% more than the old mill. Between 1980 and today, Lakeland has installed a new planer and an energy system. There has been a steady flow of improvements to all these facilities as improved technology was made available. Lakeland is known to be one of the highest recovery mills in Canada.

Lakeland's primary product is 2" by 4" precision end trim, kiln dried studs. Other products include 2" by 3" and 2" by 6" studs, studs with dadoes or holes for wiring, by-product wood chips, and hog fuel. In total, the company manufactures eight products that range in length from six to eight feet. Lakeland's products are manufactured in both metric and imperial units.

3.1.1.3 L&M Lumber Ltd.

L&M Lumber Ltd. was established in 1974 approximately one kilometer west of Vanderhoof, and has a 30 year history in the Vanderhoof Forest District. L&M began milling lumber from timber harvested on private land and eventually acquired Forest Licence A17842 in 1982. The Vanderhoof Forest District contains a significant portion of fire-born stands containing high density, small diameter pine trees. As such, significant modifications to L&M's milling facilities were made to allow the processing of small diameter trees with a minimum amount of waste. L&M acquired Forest Licence A55578 in 1997, which is a non-replaceable licence, in order to utilize and revitalize small diameter pine stands within the Vanderhoof Forest District.

L&M Lumber currently employs approximately 150 people in their mill facilities from the local area in addition to numerous contractors responsible for road building, logging, hauling, and all woodlands associated works. L&M Lumber achieved ISO 14001 certification on September 19, 2002, and as part of that certification process, the following Environmental Policy for Woodlands Operations was implemented.

L&M LUMBER LTD.

ENVIRONMENTAL POLICY WOODLANDS OPERATIONS

L&M LUMBER LTD. is committed to responsible stewardship of the forest and the environment throughout our operations.

In conducting our business, we are committed to the following:

- Compliance with all applicable environmental laws and regulations;
- Minimizing adverse environmental impacts and striving to prevent pollution;
- Promoting environmental awareness throughout our operations;
- Monitoring our environmental performance by regularly reviewing our practices, procedures, objectives and targets;
- Providing training for our employees and contractors in environmentally responsible work practices;
- Communicating our environmental performance to our directors, shareholders, employees, customers and other interested parties;
- Reviewing our environmental management system on a regular basis in order to effect continual improvement;

3.1.1.4 BC Timber Sales

The Small Business Forest Enterprise Program (SBFEP) was initially established in 1978 to help diversify and strengthen British Columbia's forest industry. In June 2001, the Ministry of Forests was directed by government to develop a plan to make the Small Business Forest Enterprise Program more effective and put it on a commercial footing. Since then, significant work has been undertaken to achieve these outcomes. A new program and organization – **BC Timber Sales** – has replaced the SBFEP. The transformation of the small business program is part of widespread policy and organizational change across the Ministry of Forests targeted at revitalizing British Columbia's forest industry. BC Timber Sales (BCTS) was fully implemented on April 1, 2003. BCTS has been set up as an independent organization within the Ministry of Forests, with financial independence from regional and district operations. The new organization will sell timber competitively through auction and has been set up to handle an increase in the volume sold.

The transformation of the SBFEP into the BCTS program also amalgamated a number of forest districts into twelve larger BCTS business areas each with a main timber sales office. The Stuart-Nechako Business Area of BC Timber Sales geographically encompasses the Fort St. James and Vanderhoof forest districts. The administrative, planning and management center for the business area is the Timber Sales Office (TSO) located in Vanderhoof. In addition to the TSO, field teams are located in Fort St. James and Vanderhoof.



BCTS
BC Timber Sales
 Stuart-Nechako

**ENVIRONMENTAL
 MANAGEMENT
 SYSTEM**

ENVIRONMENTAL POLICY

BC Timber Sales (BCTS) manages and administers timber harvesting and related forest management activities on BCTS timber sale licences and related tenures that are sold on Crown forest land throughout British Columbia.

It is the policy of the Stuart-Nechako Business Area to:

- Comply with all relevant environmental legislation and regulations.
- Strive for excellence in forest management by continually improving the performance of resource management activities and practices.
- Maintain a framework for setting and reviewing environmental objectives and targets.
- Monitor and evaluate key BCTS forestry operations.
- Endeavour to prevent or mitigate undesired environmental impacts associated with BCTS forestry operations.
- Communicate BCTS business activities and policies to all staff and make them available to the public.

Original Signed by
 Ian Hamann,
 Timber Sales Manager
 Stuart-Nechako Business Area

Date: February 1, 2005



3.1.2 Public Advisory Group

Public participation is an integral part of SFMP development and is also a specific requirement of the CSA SFM Z809-02 Standard. Because the Defined Forest Area within this SFMP encompasses public forests, public participation is essential to address the concerns and values identified by local residents. One of the public participation methods proposed in the CSA SFM standard is the formation of a Public Advisory Group (PAG), which allows for input from a broad range of interested parties.

The PAG for the Vanderhoof SFMP began with the development of a Stakeholder Analysis project. This project compiled Licensee public referral lists with the end goal of identifying all local stakeholders. Stakeholders were then contacted by mail and invited to a SFM Open House. The Open House was designed to inform and educate the public and area licensees on the concepts and overall benefits of SFM for Vanderhoof. The Open House was also advertised in local newspapers and on local radio stations.

Planning processes that require public involvement are coordinated with the help of the Community Natural Resource Committee (CNRC). This committee was created to ensure adequate involvement of the public in all forest management and planning processes. During a Vanderhoof CNRC meeting, the idea of forming a PAG for the sole purpose of creating a SFMP for Vanderhoof was introduced. A presentation of SFM was delivered to CNRC members and discussion ensued on how to create a PAG for the Vanderhoof SFMP.

The Vanderhoof SFMP PAG contributes to SFMP development by speaking on behalf of the public with regards to identification and recognition of local interests and concerns. The structure of the PAG is defined and outlined in the Terms of Reference for the Vanderhoof DFA (Appendix III). The Terms of Reference also outlines the organizational structure used for the development of the SFMP. The PAG is fundamental with regards to providing input, evaluation and feedback into the various processes of SFMP development.

The involvement of the PAG in the SFMP process began with the initial stage of interest identification. Further PAG involvement included development of indicators, measures and targets through the creation of a consensus based development chart. Forecasting and scenario designs were also reviewed and conducted as per PAG preferences. Once the SFMP is implemented in the Vanderhoof DFA, the PAG will meet annually with the Licensee Team to continually monitor, review and improve the plan over time.

3.1.3 First Nations Participation

Incorporating Aboriginal values and uses into SFM requires active participation from Aboriginal groups through various public involvement processes. As the PAG is one of the primary mechanisms for public involvement, active participation in this process by representatives of local Aboriginal group members is fundamental. In order to maintain social values that have cultural and spiritual importance to First Nations, it is important to be able to incorporate input and information from representatives of local First Nations' communities.

Levels of response received from the different Aboriginal communities that have interest in the DFA have been relatively low consisting of varying degrees of input. Both the Saik'uz and Ulkatcho First Nations have been represented at the PAG table. The Licensee Team accepted an invitation by the Ulkatcho First Nation to provide a presentation to community leaders and Elders regarding SFM within the Vanderhoof DFA. This presentation took place in the Ulkatcho

community and provided an opportunity for the attending First Nations people to review and provide input into this SFMP.

All First Nations' communities that have known traditional territory in the DFA have been invited to participate in the Vanderhoof SFM planning process through the PAG. Each First Nations' group was contacted by mail and by telephone to inform them of meeting dates and to encourage participation. Subsequent telephone invitations were also made to each group prior to initial PAG meetings. In order to maintain and even increase the level of First Nations' participation on the PAG, the Licensee Team will continue to keep local First Nations informed of SFM activities and reports, particularly as it applies to the specific interests of local First Nations.

3.1.4 Continual Improvement

Continual improvement relies on the ability of forest managers to recognize, plan for and adapt to changes as they occur. Over time, changes will occur involving forest management and practices depending on advances in research and technology and the value of the forest resource held by industry and members of the public. In keeping with the principles of SFM, it is important to ensure opportunities to continually improve the SFMP are available and implemented as needed. Initially, continual improvement will focus on filling gaps in data and information necessary to complete the SFMP. Once the plan is completed, continual improvement will respond to changes identified over time. Table 3 identifies potential sources of change with regards to forest management and the corresponding continual improvement strategy designed to address the potential change.

Table 3. Continual Improvement for Vanderhoof SFMP

Potential Source of Change	Continual Improvement Strategy
Change in environmental condition (e.g. forest fire).	- Performance monitoring of measures will occur as outlined in Section 4.0 of this plan, comparing results to original targets. - Adjustments to practices and/or targets are made based on circumstance.
New research or information made available relating to identified measures.	- Information will be reviewed and analysed by Licensee Team. - Proposed adjustments to management practices or targets are drafted and presented to the PAG for review. - Adjustments to practices and/or targets are made as a result of the new information.
Changing social values, harvest levels or SFM criteria.	- Periodic meetings are held with the PAG as identified in Section 4.0 of this plan where local changes in public values over time will be identified. - PAG annual review of plan and report, and recommendation of improvements - Audits will be completed to verify compliance to the SFM criteria and/or standard. - Adjustments are made to practices and/or targets as necessary. - Adjustments made to harvest level to manage for beetle salvage

During the first few years of SFMP implementation, continual improvement activities will also respond to plan deficiencies or strategies that were unsuccessful. Some of the indicators,

measures and targets identified in this plan are relatively new concepts that have no historical information to assist with the setting of goals. Over time, these deficiencies will become known and the SFMP can be adapted to account for any required modifications to management.

As discussed in a later section, the Vanderhoof SFMP will be delivered and implemented through each of the participating licensee's existing Environmental Management System organizational structure (EMS). As such, each Licensee Team member will update existing EMS systems to include and respond to SFM policy requirements. The EMS is ultimately a performance management system and the SFMP will continually improve, adjust and adapt to changing circumstances that are potentially identified through EMS protocols.

3.2 Supporting Information

SFM plans incorporate a vast amount of information about a specific management area in order to develop landscape and stand level strategies to promote sustainability of the forest resource. This section outlines the primary support systems of this SFMP. It begins with highlights of existing legislation, policies, strategic or higher level plan linkages, and then describes the importance of the EMS to the SFMP. Next, information regarding the analysis of existing and required DFA inventories is included and then an overview of current management practices occurring within the DFA. The last two components of this section include a discussion of the Multi Criteria Analysis (MCA), which was used to prioritize and develop scenario designs, and finally a description of the forecasting methods used to predict future conditions for the measures of SFM within this plan.

3.2.1 Legislation, Policies, Strategic Plans

SFM initiatives will utilize and incorporate many of the existing strategies and policies previously developed for the DFA by various stakeholder groups. As well, one of the requirements of the CSA Z809-02 standard is that the participants who are implementing the SFMP must meet all regulatory requirements relating to forest operations. This requirement must also be monitored and tracked to ensure legal compliance, and this will be achieved through the existing EMS of all SFMP participants. The following table outlines the intent of this SFMP within the realm of some of the most important existing legislation, plans and policies with regards to SFM. Management objectives contained in these initiatives will be captured with the implementation of the SFMP.

Table 4. Vanderhoof SFMP Linkages to Existing Legislation, Policies, or Strategies

Document	Linkage to Vanderhoof SFMP
Forest and Range Practices Act (FRPA)	FRPA provides forest managers with a "results-based" structure upon which to develop and deliver forest management. The SFMP is also "results-based" in nature, providing the participants a context to develop, implement and report on achievement of objectives. The plan must meet or exceed the requirements set forth in FRPA.
Cariboo-Chilcotin Land Use Plan (CCLUP)	The CCLUP is a higher level plan designated for the Cariboo-Chilcotin Land Use Area. The southeast portion of the Vanderhoof DFA lies within the Cariboo-Chilcotin Land Use Area and is therefore influenced by this plan. The CCLUP was started through the Commission on Resources and Environment (CORE) process to give the public a direct say in the development of land use plans within their region. CCLUP was released in October 1994 and addresses concerns about sustaining the region's economy and environment. The portion of the DFA that is within the area under the CCLUP is obligated to meet the requirements of CCLUP as it has been designated a higher level plan by government. The land area of the DFA that overlaps CCLUP lies within a Special Resource Development Zone, indicating timber harvesting may occur as long as existing fish, wildlife, ecosystem, backcountry recreation, and tourism values are respected.
Land and Resource Management Plan (LRMP)	The Vanderhoof LRMP was a community-based process used to develop land use strategies where decisions were made through consensus from members of the public, forest licensees and government resource agencies. The LRMP was approved in 1997 and provides strategic direction and identification of objectives for individual resource management areas. The SFMP has incorporated strategies from the LRMP including access management, Protected Areas and Ungulate Winter Range. Certain objectives developed in the LRMP were also integrated into the measures of SFM defined and discussed in Section 4.0 of this plan.
Timber Supply Review (TSR)	The main objectives of a TSR are: 1) to identify economic, environmental and social information that reflects current forest management practices including their effects on the short and long-term timber supply; 2) to identify where improved information is required for future timber supply forecasts; and 3) to provide the Chief Forester with information to make any necessary adjustments to the AAC for the next five years. Currently, the SFMP addresses the above listed first and second objectives. In the future, it is anticipated that once the SFMP is fully implemented the nature of TSR will change to become part of the continual development of the plan.

Table 4 (Continued)

Vanderhoof Innovative Forest Practices Agreement (IFPA)	IFPA's are an initiative of the Ministry of Forests and are awarded to licensees in order to conduct projects that will test new and innovative forestry practices. IFPA proponents must prepare a Forestry Plan that outlines any proposed forest management projects and strategies. The Vanderhoof SFMP will work in conjunction with the Vanderhoof IFPA with regards to findings and information developed by various IFPA projects. IFPA projects have produced data sets for the Vanderhoof District in the past and future projects will also produce similar data outputs that may be used in the monitoring phases of this plan. Many of the criteria, indicators and measures contained within the SFMP may be dependent on certain inventories and studies conducted by local IFPA initiatives.
Canadian Standards Association (CSA)	This SFMP is the document that supports the SFM requirements of the CSA Z809-02 Standard necessary for eligibility for certification under CSA. Some of the requirements for SFM in a DFA include public participation, performance measures, a management framework, action and response plans, and a commitment to continual improvement.
ISO 14001 Environmental Management System (EMS)	The ISO 14001 standard governs the implementation of an EMS, which is a series of performance requirements and measures developed and implemented on the land base. The CSA Z809-02 standard is consistent with the ISO 14001 standard. Each requires a detailed management system that will fulfil the requirements of the standard. The primary linkage between the EMS and the SFMP will be in the areas of roles and responsibilities, tracking, monitoring, corrective actions, internal/external audits and reporting of performance.
Forest Investment Account (FIA)	The provincial government administers the FIA in order to provide funding to the forest industry. This funding can be used for several approved ventures including development of sustainable forest management practices. The FIA contributes to this SFMP with funding to carry out inventories and SFMP development, and to support many of the solutions and/or testing of SFM thinking.
FIA Land Base Investment Rationale (LBIR) as part of the FIA Land Base Investment Program (LBIP)	The LBIP is one of the programs administered under the FIA involving investments in land base activities planned and delivered by licensees according to government standards. A LBIR provides an overview of management unit issues that need to be addressed for the achievement of desirable future forest conditions. The LBIR provides a link between these management unit issues and a FIA investment schedule. As the SFMP is implemented across the DFA, the LBIR will help to prioritize FIA funded activities in order to reach management unit targets identified by the SFMP.

Table 4 (Continued)

Prince George TSA Potential AAC Uplift, 2004	In 2002, the AAC for the Vanderhoof Forest District within the Prince George TSA was increased to 5.5 million cubic meters to battle the continuing mountain pine beetle epidemic. In 2004, a new timber supply analysis was completed and it revealed that an additional 1 to 1.5 million cubic meters of pine stands that have been impacted by beetle infestation could be harvested annually for five years. In light of this additional AAC uplift, harvesting activities to battle the beetle in the short term must be accomplished with a vision of SFM for the future. The beetle epidemic simply adds one more variable that must be managed in order to move toward the DFA target of SFM. As the latest uplift was completed in October 2004, future annual reviews of the SFMP will deal with new AAC levels.
Strategic Harvest and Investment Planning (SHIP), 2004	The Vanderhoof IFPA initiated the SHIP in order to quantify the impacts of the mountain pine beetle epidemic on timber supply in the DFA. The SHIP model is a forecasting system that can be used to determine the future state of the forests in the DFA based on certain assumptions. Reports and data sets specific to the Vanderhoof Forest District were produced through SHIP and this information will be used to produce certain base case numbers within this SFMP. SHIP is also one of the modeling systems being considered for use in this SFMP as it utilizes very current data and is specific to the Vanderhoof DFA.
PG TSA Forest Health Care Strategic Plan, 2004	The Forest Health Care Strategic Plan commenced April 1, 2004 and is intended to address the short, mid and long-term impacts of the mountain pine beetle epidemic. Like the SFMP, it uses performance information such as indicators and measures to assess success in meeting objectives, and also supports an adaptive management approach. Methods of monitoring described in the Forest Health Care Strategic Plan may be effectively incorporated into the SFMP with regards to the monitoring and evaluation activities associated with the SFMP C&I.
Protected Areas Strategy (PAS)	The PAS was developed by government to put aside 12% of British Columbia as Parks and Protected Areas by the year 2000 in order to protect representative ecosystems around the province. Protected Areas within the DFA were developed through the LRMP process in order to preclude timber harvest in these areas and to protect high value, critical habitat or unique landscape areas. The Vanderhoof SFMP will respect the Protected Areas that have been identified within the DFA. As part of SFM, these areas will not be included in management strategies in order to preserve the landscape features within each area.

Table 4 (Continued)

Forest Development Plan (FDP)	A FDP is described in the Forest Practices Code Guidebook as a document that describes and illustrates how harvesting and road development for a specific area will be managed for a period of at least five years (BC MOF 1995c). The general objective of this plan is to provide the public and administering government agencies with information on the location and scheduling of proposed roads and cutblocks, for harvesting timber in a manner that demonstrates management for biological diversity, soil conservation, water, fish, wildlife, and other forest resources, and recognizes the economic and cultural needs of peoples and communities (BC MOF 1995c). FDPs are the primary link of SFM to on the ground operations. FDPs are available for review by the public and once public input has been considered the FDP is reviewed and approved by government. In conjunction with other operational plans, the FDP will be the driver of SFM implementation for Licensee Team members in the DFA until FRPA replaces the Forest Practices Code. Once FRPA is implemented, the Forest Stewardship Plan (FSP) will replace all previous FDPs.
Forest Stewardship Plan (FSP)	Once FRPA is implemented, FSPs will replace FDPs to link government objectives to practices on the ground through various results and strategies. The FSP is a landscape level plan that is submitted to government for approval and it will be the driver of site-specific operational plans. The FSP will eventually be the primary operational plan that will contain various management strategies to help achieve the SFM goals of the DFA. Each Licensee Team member will be responsible to ensure that SFM principles are upheld through implementation of FSPs and other operational plans.
Site Plan (SP)	The SP is a legislatively required site level plan that identifies the approximate locations of cutblocks and roads, and identifies how the intended results or strategies described in the Forest Development Plan (Forest Stewardship Plan) will be implemented. SPs must be made publicly available on request but are otherwise an internal planning document. In the context of this SFMP, the SP is one of the tools that will outline specific management strategies in place to achieve SFM. The SP is where strategies will be prescribed to a particular site based on its overall characteristics. Site level activities will be inspected once complete and compared to the SP to ensure adequate management toward SFM.

Table 4 (Continued)

Vanderhoof Forest District Transitional Harvest Dry Wood Strategy	As part of bark beetle management in the DFA, this strategy is intended to maximize the recovery of deadwood stands prior to deterioration beyond merchantability. This strategy also identifies harvest priorities, minimizes the "fall down" period between deadwood harvest completion and immature stands reaching merchantability, and finally, addresses the sustainability of mills currently operating in the DFA. Beetle killed timber continues to be a part of the timber supply to be managed under the SFMP. Utilization of dry wood will become an important aspect in the future as the DFA recovers from the mountain pine beetle epidemic. Strategies like this will help to focus timber harvesting activities in order to make the best management choices for the forest resource as a whole.
Ungulate Winter Range (UWR)	The two documents relevant to this topic include the Memorandum of Understanding (MOU) on Establishment of Ungulate Winter Ranges and Related Objectives (May 2003) and the Northern Caribou Ungulate Winter Range in the Vanderhoof Forest District (Draft 2004). UWR is area critical to the winter survival of a specified ungulate species. Management objectives developed for UWR specify the desired habitat condition and are intended to provide guidance for forest harvesting, road construction, range use, access management, forest health and fire management activities. Through the MOU, mule deer winter range was established within the Vanderhoof Forest District. These areas contain specific management objectives that will be followed in conjunction with this SFMP. The Tweedsmuir Entiako caribou herd's range also overlaps with the SFMP DFA. Therefore, UWR units were developed along the western boundary of the DFA. When approved, these UWR objectives will be legal under FRPA. Each participating licensee of the SFMP will be required to adhere to these objectives and provide a suitable compliance tracking system.
SFM Framework Document	The SFM framework is the conceptual forest management strategy for the Vanderhoof DFA. The overall goal is the creation of a scientifically defensible, data-driven, locally derived, hierarchical approach to SFM that is operationally feasible at the local level. Along with the CSA SFM Z809-02 Standard, this document provided the basis for the Vanderhoof SFMP. The indicators and measures developed by the Licensee Team and the PAG were originally derived from the Criteria described within this document. This framework along with the SFMP will help Licensee Team members implement SFM across the DFA.

3.2.2 ISO 14001 Environmental Management System

The CSA Z809-02 Standard indicates that it is consistent with the internationally recognized ISO 14001 Environmental Management System Standard. Each Standard requires the development of a management system and these systems operate in a similar fashion. For both the SFMP and the EMS a plan is implemented along with checking and corrective action, and it is followed up with a management review. As these systems contain such similarities, one can work in conjunction

with the other. Certain aspects of SFM can be appended to an existing EMS system, thereby eliminating the need to develop another set of management system components. Some of the SFM components that could be managed through an EMS include a responsibility matrix, tracking and recording of SFM training needs, communication requirements, documentation and document control, operational procedures and control, and finally, emergency preparedness and response. In general, an EMS contains procedures around these issues that have already been implemented within ISO certified organizations. Updates to an existing EMS to ensure compliance with SFM requirements will be the responsibility of the participating licensee should they choose to pursue CSA certification.

Overall, the primary linkage between an EMS and SFM certification will be in the areas of tracking, monitoring and reporting of performance. EMS documents will require additions to account for SFM or new procedures will need to be developed in order to accommodate SFM requirements. Tracking elements may differ between the two management systems, as SFM requires tracking of very specific items. If tracking can not be incorporated into an existing EMS, then other tracking systems will need to be developed to meet SFM requirements for certification.

3.2.3 Inventory Analysis

The inventory analysis for the Vanderhoof SFMP, in broad terms, involves the collation or assembly of data available for use during the development of the SFMP and through continual improvement of the plan. Over the years, through licensee, government, academic, or other funding, the Vanderhoof DFA has had a number of land based inventories completed. Larger land based inventories involving the Prince George TSA have also been completed. Recorded inventories for use within this SFMP cover interests such as forest health, forest inventory, rehabilitation, general management, growth and productivity, biodiversity, wildlife, watershed management, and archaeological inventory.

Existing inventories within the DFA were analysed and compiled on March 31, 2003. A listing of the inventories can be found in Appendix IV. Details on the availability of spatial data, digital format and spatial resolution are also listed for each inventory or report. The Vanderhoof SFMP will serve as the mechanism for updating or initiating inventories on an annual basis. As this plan is a collaborative effort, required inventories may also be coordinated through the Licensee Team in order to increase efficiencies and reduce overall costs.

An additional part of the inventory analysis includes indicator mapping. SFM assumes that the entire land base (whether managed or unmanaged) contributes to meeting ecological, economic and social goals of sustainability. Therefore, indicator mapping is a tool that assesses the current levels of resources to be sustained in the DFA and can show how these resources are spatially contributing to the defined sustainability targets within this plan. The DFA is delineated into the Timber Harvesting Land Base (THLB) and the Non-timber Harvesting Land Base (NHLB) in order to assess the contributions of both areas into meeting SFMP targets.

3.2.4 Current Management Practices

An assessment of the current management practices utilized in the DFA will help to determine how current practices impact the sustainability of forestry related values within the management area. Forestry practices include harvest methods, silviculture systems, and reforestation activities and each of these is determined through forest management planning and production of operational plans. Each management practice occurring within the DFA is a result of historical analysis of the land base to determine ecological classifications, and years of testing practices in order to determine the Best Management Practices (BMPs) for landscapes within the Vanderhoof

DFA. Within this plan, BMPs are defined as a forestry practice or combination of practices determined to be the most practicable means of protecting and conserving forest resources and forest land productivity, now and into the future. Current methodologies incorporate ecosystem values and natural disturbance theories in order to manage the DFA within natural ranges of variation as identified through research and analysis of the land base over time.

3.2.4.1 Emergency Preparedness and Response

Each Licensee Team member's Environmental Management System (EMS) or Standard Operating Procedures (SOPs) contain various emergency preparedness and response plans including fire preparedness plans, and safety procedures and plans. As part of the updates taking place within EMSs and SOPs to ensure SFM requirements are met, emergency preparedness and response plans will also be updated as required to ensure SFM elements are realized through these existing plans. Current emergency preparedness and response plans establish and maintain procedures for responding to accidents and emergency situations within the DFA. These plans also identify potential for emergency situations and help to establish pro-active strategies to prevent emergency situations from occurring.

3.2.4.2 Current Forest Development Plans

Forest management planning within the Vanderhoof DFA is currently in a state of transition as several management plans including this SFM plan are being developed. With the Forest and Range Practices Act, Vanderhoof Licensees are required to develop Forest Stewardship Plans for their operating areas. As these plans have been submitted to government but not yet approved, this section will deal with the most recently approved Forest Development Plans (FDPs) created under the Forest Practices Code.

Licensee Team members are currently operating under approved FDPs that contain information about a Forest Licensee's intended activities for their area of operations under a specific Forest Licence. FDPs contain strategies for managing a wide range of resources and issues including proposed harvest and road construction, forest health, riparian areas, terrain stability, reforestation requirements, wildlife, and scenic areas. Plans under the Forest Practices Code tended to be prescriptive in nature with a substantial amount of government review. Forest Stewardship Plans will continue to be reviewed and approved by government, but they have changed to a results based format as opposed to the more prescriptive Forest Development Plan. This SFM plan has evolved along with the Forest Stewardship plan to a results based level as well. Management goals have been set and Licensees are responsible for achieving the stated targets. How the target was achieved is not tracked and reviewed, only if the target was achieved.

Sections 4.1 to 4.70 of this plan detail each individual measure of SFM for the Vanderhoof DFA. Each measure contains information related to the implementation of this SFMP in a section titled Management Modification and Linkage to Operational Plans. Within this section, the status of practices prior to the development of the SFM plan is discussed in relation to the current FDP and other operational plans. A description of practices related to the implementation of this plan is also included to show the transition of practices required for implementation of the SFMP. Once the SFMP is in place and operational, this section will be revised to include a discussion about the learning curve associated with the management review of the SFMP. After implementation, the SFMP will be reviewed on an annual basis where potential

improvements will be identified. The SFMP will be revised where required to ensure the SFM goals and commitments made by the Licensee Team are upheld.

3.2.4.3 Operational Plans

Operational plans reflect ground level applications of all management policy and planning. The SFMP is implemented via these plans through a combination of Best Management Practices that are prescribed for a particular management area or individual harvest site. Operational plans essentially translate strategies and initiatives to forest management activities such as harvesting, silviculture and road building. Forest Development Plans (FDPs) are landscape level operational plans that provide management direction to a specified area. Site Plans (SP's) (formerly Silviculture Prescriptions) are site level plans that define site specific practices such as harvest method, silviculture system and basic silviculture requirements for a particular harvest site. SP's guide forestry practices through to free growing and are completed on an individual site basis prior to harvest.

3.2.4.4 Harvest Methods

Harvesting throughout the DFA is accomplished using conventional ground-based harvesting techniques involving feller bunchers, crawler tractors and rubber tired skidders. The topography throughout the DFA does not generally require cable-harvesting techniques as steep slopes and sensitive soil regimes are rare. Sites that require equipment other than ground based systems are generally not scheduled for harvest unless management of the area would provide significant ecological, economic and social benefits. Harvesting activity occurs during summer and winter seasons depending on site conditions and beetle management priority. Areas with more sensitive soils or areas with higher compaction hazards are logged in the winter when the ground is frozen to mitigate impacts. Summer harvest generally occurs on dry sites where the impacts to soil conditions are low.

Roadside harvesting is utilized across the DFA. This harvesting system uses the constructed road area as the location to process timber. Felled trees are skidded to the roadside where a processor de-limbs and cuts the log to utilization standards. Processed logs are then decked along the roadside where they are eventually loaded onto trucks and hauled to the mill. Waste wood such as branches and trimmings are piled into debris piles along the roadside where they are eventually disposed of through burning. Roadside processing distributes soil disturbance more evenly across the site and helps to minimize compaction through repeated machine traffic on designated trails within a harvest area.

3.2.4.5 Silviculture Systems

The majority of the DFA is harvested using a clear cut with reserves silviculture system. Partial cutting systems may be used in scenic and riparian sensitive areas. Initially, the harvest of beetle infested timber was conducted through small patch or individual tree harvesting. Current beetle infestation levels have resulted in amalgamation of small patches into larger clear cuts, often exceeding 1000 hectares in size. Overall, natural disturbance patterns within the Vanderhoof DFA indicate that management techniques should trend toward development of larger clear cuts with reserves in order to emulate historical natural disturbance patterns. As resource objectives continue to become increasingly complex, so will the design of silviculture systems.

3.2.4.6 Basic Silviculture

As per legislative and most Forest Licence requirements, licence holders within the DFA are required to reforest and produce free growing stands on all areas harvested after October 1987. To ensure a minimum regeneration delay period and complete stocking of harvested areas, generally all areas are planted with nursery grown tree seedlings. The species planted on harvested sites depends on ecological characteristics of the site and also what species were logged from the area. Based on the forest cover of the DFA, pine and spruce seedlings are the most common stock used, with some Douglas-fir being planted on certain sites. Mechanical site preparation, and to a lesser extent chemical site preparation, are used to promote artificial regeneration of harvested sites. Site preparation treatments are completed on areas where straight planting will not yield a healthy crop tree. Examples of these areas include sites with heavy slash or vegetation, or wet areas that require a raised microsite for planting.

After a harvested site is planted, it must be monitored in order to ensure the crop of trees is growing naturally and uninhibited. Mechanical brushing and weeding treatments are applied to plantations where competition from vegetation will inhibit tree growth. Chemical brushing and weeding treatments are not often used, but may occasionally be applied depending on the characteristics of the site. Surveys are conducted on all sites to determine regeneration performance, brushing and weeding requirements and to assess free growing status. Once free growing status is achieved the requirement of basic silviculture is complete and the forest stand is reverted back to Crown land.

3.2.5 Multi-Criteria Analysis

As mentioned in Table 4, the SFM framework document provided much of the background to the processes leading up to development of this SFMP. A Multi Criteria Analysis (MCA) was one of the decision support tools suggested through the SFM framework document to efficiently combine and analyze data, expert judgements and information about the preferences of First Nations, the general public and stakeholders for consideration in SFM decision making. Within this SFMP, the MCA was used to assess priority ranking and risk of the SFM criteria.

As part of the MCA for the Vanderhoof SFMP, members of the PAG were asked to make trade-offs by choosing priorities and risk tolerance for the nine criteria of SFM identified within the SFM development chart. Members of the PAG were asked to conduct the following four steps with regards to the criteria:

- 1) Rank the criteria in order of priority.
- 2) Weight criteria by distributing points.
- 3) Rank criteria most at risk of not being achieved.
- 4) Weight criteria by risk priority.

According to the Vanderhoof PAG MCA results, the three values that were ranked the highest according to PAG members were Timber Economic Benefits, Quality of Life, and Biological Richness. Appendix V contains the detailed MCA results for further reference. Utilizing this public weighting scheme helped to prioritize certain criteria and provided decision-makers a rational and objective basis for choosing between the different stakeholder priorities.

3.2.6 Scenario Analysis and Forecasting

The scenario analysis for this SFMP was derived from the MCA conducted through the PAG. The Base Case for forecasting purposes is a scenario that identifies the current status of forest

management and how a continuation of today's management will affect the measures of SFM identified within this plan. Assumptions for the Base Case include an AAC of 5.5 million cubic meters, biodiversity based on the Provincial order delineated by BEC unit and landscape unit, ungulate winter range, visual quality, riparian reserves and assumptions involving mountain pine beetle infested timber from the SHIP analysis.

Certain other scenarios were identified by the PAG as being important to the development of the SFMP as part of a range of situations that could be managed for, through strategies developed within the plan. These scenarios included one in which maximum harvest levels were implemented, where no constraints around biodiversity, visual attributes or integrated resource management were considered. To counter maximum harvest, a no harvest scenario was also identified where the entire land base within the DFA would be preserved for values other than timber harvest. Other scenario options that were deemed valuable in the quest to identify an overall SFM scenario included a recreation based scenario and a biodiversity based scenario. In the recreation scenario, all Base Case assumptions remained static except for visual quality attributes and the size of riparian reserves. In order to maximize recreation values, the visual quality classes were increased by one class and riparian reserve sizes were increased until the total was equal to 12% of the land base. In the biodiversity scenario, again all Base Case assumptions remained static except for reserve area size. As the scenario is meant to highlight biodiversity, no harvest activity would occur in riparian zones or in ungulate winter range areas, and reserve areas would be increased with riparian areas consisting of 12% of the land base and wildlife tree patches consisting of 15% of the land base.

Forecasting is an explicit statement of the expected future condition, through time, of an indicator or measure. Projections will be used to compare measures and sustainability targets over time with use of current and best management practices in order to assess the level of risk for each indicator or measure. Each scenario identified in the scenario analysis was forecasted to predict future conditions of the DFA and the influence of each management scenario to the measures of SFM identified in this plan. As this plan was developed, forecasting was able to identify the future state of measures that contained a quantitative character. All other measures in this SFMP were forecasted with alternate methods, including a logical "what if scenario" analysis of each measure and how the values of SFM would be affected if the target for each measure were not achieved. Forecasting results for each of the above mentioned scenarios are summarized in Appendix VI.

Based on the results of the scenario analysis and forecasting, the Licensee Team determined that a balance of PAG interests and values could not be adequately captured within any of the identified scenarios. Licensee Team members then used the results of the MCA, discussions from the October 14th PAG meeting, and the results of the scenario analysis questionnaires that were handed out at the October 14th PAG meeting, to formulate a SFM scenario. The SFM scenario designed for this plan was created to achieve a balance of PAG values and Licensee Team needs in the realm of SFM.

The SFM scenario provides an achievable balance of values and incorporates each measure that was identified through the PAG and included in the approved development chart. In comparison to the Base Case, the SFM scenario increased Wildlife Tree Patch retention to 10% of the land base as opposed to 8%. The Base Case utilized the Provincial order for biodiversity objectives, whereas the SFM scenario uses the Landscape Objective Working Group (LOWG) biodiversity objectives, which incorporate Natural Disturbance Unit (NDU) science rather than broad landscape units and Biogeoclimatic Ecosystem Classification (BEC). The SFM scenario developed for the Vanderhoof DFA also incorporates the latest Allowable Annual Cut (AAC)

determination made by the Chief Forester. The SFM scenario starts in year zero with a cut level of 6.5 million cubic meters per year. While this cut level will not be achieved immediately with implementation of this SFMP, it was used in this scenario as it will be the cut level given to licensees in the near future and is an accurate picture of how forestry operations will be conducted in the short term. The timber harvesting land base (THLB) in the SFM scenario is slightly less than in the Base Case due to an increase in retention across the DFA. A long-term sustainable harvest level of 2.57 million cubic meters per year was also identified in the SFM scenario. This scenario will achieve sustainability of a balance of values across the DFA and will assist the Licensee Team in trending toward the targets identified for the measures of sustainability in the Vanderhoof DFA.

Implementation of the SFM scenario will be accomplished through this SFMP and the monitoring and reporting of results will be presented in future annual reports. Forecasting and modeling of forest resources provides a picture of forest condition that will undoubtedly change throughout time. Future forecasting of the measures of SFM in the context of this plan and the SFM scenario will be required in order to ensure the balance of values and the sustainability of the forest resource continues to be achievable across the DFA.

4.0 SFM Criteria, Indicators and Measures

Criteria and Indicators form the basis of the SFMP as they assess progress toward achieving the goal of SFM. The working definition of SFM within this plan is the balanced, concurrent sustainability of forestry-related ecological, social and economic values for a defined area over a defined time frame (see glossary in Appendix II). Within this SFMP, the participants developed local Indicators and Measures for the Vanderhoof DFA from Criteria listed in the SFM framework document using a variety of decision support tools, such as the MCA. Although the Criteria within the framework document differ from the Canadian Council of Forest Ministers (CCFM) SFM Criteria and subsequent CSA SFM Elements from the CSA SFM Z809-02 Standard, they are integrally connected to one another. The CCFM set of C&I provided the context and foundation for the creation of locally relevant C&I applicable to the forests within the DFA.

The CCFM and CSA approach differs slightly from the one used in the SFM framework document and the development of this SFMP in terms of focus below the Criteria level. As such, the hierarchy used in this plan does not translate level for level with the CSA hierarchy. However, the two approaches can be cross referenced relatively easily and this is illustrated in Table 5.

The hierarchy used in this plan and the resulting measures of SFM were developed in a unique manner, but they ultimately encompass the CCFM Criteria and CSA Elements, and therefore meet the requirements of the CSA SFM Z809-02 Standard. Table 6 identifies the Criteria and Elements as suggested by the CCFM and the CSA, as they are the basis for certification under CSA.

Table 5. Cross Reference of SFMP Hierarchy versus CCFM Hierarchy

CSA Hierarchical Level	Relationship to Vanderhoof SFMP	Rationalization
Criterion	Equivalent to SFMP Criterion	- Both based on CCFM - CSA uses CCFM verbatim - SFMP uses intent of CCFM and interprets them to create more meaningful / understandable statements
Element	Embedded partially in SFMP Criterion statement and in Indicator statement	CSA elements serve to elaborate and specify the scope of their associated Criterion. The SFMP Criteria are more specific in their intent than the CCFM Criteria. As well, the SFMP Indicators are designed to further elaborate and specify the measurable aspects of their associated Criterion (which tends to be more of a broad goal than a specific statement). The concepts embedded in the Elements are addressed in both the SFMP Criteria and Indicators.
Value	Embedded in SFMP Indicator statement	Together, the CSA Value and Objective are equivalent to the SFMP Indicator. The Value identifies the characteristic or quality considered to be important and the Objective states what is desired of it. The SFMP Indicator achieves both tasks in one statement.
Objective	Equivalent to SFMP Indicator	See above
indicator	Equivalent to SFMP Measure	This is simply a difference in terminology. The CSA Indicator is a variable that is measured over time to give information about the Objective. The SFMP Measure does the same.
Target (with thresholds / limits)	Equivalent to SFMP Thresholds (targets)	This level is the same in each approach.

Table 6. CCFM Criteria and CSA Critical Elements

Criteria	Critical Element
Conservation of Biological Diversity	- Ecosystem Diversity - Species Diversity - Genetic Diversity - Protected Areas and Sites of Special Biological Significance
Maintenance and Enhancement of Forest Ecosystem Condition and Productivity	- Ecosystem Resilience - Ecosystem Productivity
Conservation of Soil and Water Resources	- Soil Quality and Quantity - Water Quality and Quantity
Forest Ecosystem Contributions to Global Ecological Cycles	- Carbon Uptake and Storage - Forest Land Conversion
Multiple Benefits to Society	- Timber and Non-timber Benefits - Communities and Sustainability - Fair Distribution of Benefits and Costs
Accepting Society's Responsibility for Sustainable Development	- Aboriginal and Treaty Rights - Respect for Aboriginal Forest Values, Knowledge and Uses - Public Participation - Information for Decision-making

The following sections identify the measures chosen by the Licensee Team and the Vanderhoof PAG to define the local targets identified for the Vanderhoof DFA. The associated development chart of criteria, indicators and measures has also been included in Appendix VII. Within this

SFMP, the following definitions apply as per the SFM framework document (see glossary in Appendix II):

Value – A standard or principle considered valuable or important in life. The three values in this SFMP and ecological, economic and social.

Criterion – A category of conditions or processes by which sustainable forest management may be assessed; characterized by a set of related indicators which are monitored periodically to assess change (Montreal Process 1995). Criteria are meant to be broad management objectives that are proven through the repeated, long-term measurement of associated indicators.

Indicator – A measure of an aspect of the criterion; a quantitative or qualitative variable which can be measured or described and which, when observed periodically, demonstrates trends (Montreal Process 1995). Indicators are used in monitoring the effectiveness of activities, in terms of outcomes, as opposed to compliance monitoring in a rule based approach.

Measure – A set of variables that provide quantitative information about the status/standard/threshold established for an indicator. Measures of indicators represent the actual “things” or land based resources that are tracked over time and space. They provide the on-the-ground link to indicators, criteria and values, and signal the trend for each resource.

Threshold (target) – Thresholds specify amounts or levels of different resources, as reflected by indicators, and warn managers of the potential for impending unsustainable conditions. Thresholds imply a range (i.e. 5-20 snags per hectare) while ‘target’ implies a static number (i.e. Allowable Annual Cut).

4.1 Distinct Habitat Types

Statement of Measure	Management Objective
1-1.1, 1-5.3 The percent area of distinct habitat types in the DFA.	Sustain the percent area of distinct habitat type as listed in Table 7.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Ecologically distinct habitat types are represented in an unmanaged state in the DFA to sustain lesser known species and ecological function.
- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Genetic Diversity of plant species within the Defined Forest Area (DFA) is sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity

- Element 1.1 – Ecosystem Diversity
- Element 1.2 – Species Diversity
- Element 1.3 – Genetic Diversity
- Element 1.4 – Protected Areas and Sites of Special Biological Significance

What is this measure?

The term “biodiversity” is complex and it is difficult to demonstrate the conservation of the value over time. Biological richness is a much more concise term and is a credible surrogate for biological diversity (Bunnell 1998 and Wells et al. 2003). The concept of “sustaining biological richness” as used in this SFMP was derived from the work initially developed by Dr. Fred Bunnell and the Weyerhaeuser Adaptive Management Working Group (Bunnell et al. 2003). The concept of biological richness is relatively new science in British Columbia and more extensive research documents are listed in Appendix VIII for further reference.

Biodiversity The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part, this includes diversity within species, between species, and of ecosystems (Canadian Biodiversity Strategy, 1995).

The intent of sustaining biological richness is to maintain productive, well-distributed populations of species and diverse gene pools in the DFA over time. This can be assessed through the use of four indicators:

- ecosystem representation,
- habitat and landscape elements,
- species productivity and distribution, and
- genetic diversity of plant species.

This measure relates primarily to the first of the above listed indicators of biological richness, which is ecosystem representation. Maintaining a representation of a full range of ecosystem types is a widely accepted strategy to conserve biodiversity in protected area networks (e.g. Margules and Pressey 2000) and is suggested for landscapes managed for forestry (e.g. Lindenmayer and Franklin 2002). Ecosystem representation is a coarse filter approach intended to ensure a proportion of ecologically distinct ecosystem (habitat) types are maintained within both the Non-timber Harvesting Land Base (NHLB) and the Timber Harvesting Land Base (THLB) (refer to glossary in Appendix II). Maintaining these natural habitat types will help to ensure a natural range of species and genetic diversity is maintained across the land base. Maintenance of ecosystems will occur primarily within the NHLB as management practices do not generally occur on this land base, thereby disrupting the natural patterns of the landscape. It is documented that maintaining representative ecosystems in an unmanaged state (e.g. NHLB) is important for three reasons (Wells et al. 2003):

- 1) they sustain poorly understood ecological functions and species habitat requirements,
- 2) they act as a precautionary buffer against errors in efforts intended to sustain species in the managed forest, and
- 3) they provide an ecological baseline against which the effects of human activities can be compared.

Maintenance of distinct habitat types on the NHLB is important for many reasons, including the use of natural landscapes in comparison to managed landscapes and the differences in values that

each land base type shows with regards to the maintenance of distinct habitat types. Unmanaged stands play an important role as a precautionary buffer against errors in efforts intended to sustain species and a variety of genes within the managed forest. There is currently insufficient knowledge available regarding management practices that will ensure all species' requirements are met within managed stands. This is particularly true of poorly known or completely unknown organisms.

Poorly understood ecosystem functions can also be sustained within unmanaged forest areas. For example, within the NHLB, natural disturbances may occur that would otherwise be suppressed or managed if they were to occur within the THLB. While some aspects of natural disturbance can be mimicked in managed stands, other aspects cannot (e.g. large patches of burned snags, or large areas attacked by bark beetle). Some species benefit from, or rely on these features of natural disturbance, and as such may not be productive in managed landscapes.

A final function of unmanaged areas is to provide an ecological baseline against which the effects of human activities can be compared (Arcese and Sinclair 1997). This role as a benchmark is especially critical in the long-term monitoring required to assess effectiveness of forest practices.

Although the NHLB will be the primary source of representative ecosystems, habitat types and species occur throughout the DFA and distinct habitat types must also be considered and managed for within the THLB in order for this measure to remain sustainable in the future. Knowledge of the state of representation of different ecosystem types within the NHLB allows managers to set habitat priorities within the THLB in order to achieve overall targets on a DFA wide basis.

While maintenance of ecosystems in the NHLB involves an inventory analysis of pre-defined areas, maintenance of ecosystems in the THLB can primarily be accomplished through retention of areas of mature forest across the land base. Assurance of ecosystem representation in the NHLB and a distribution of unmanaged reserves, at a variety of scales (small and large), throughout the THLB will help to ensure that a variety of distinct habitat types are maintained within the DFA.

Current practices and state of measure

The Vanderhoof DFA contains two levels of unmanaged forest: 1) at the stand level, which includes wildlife tree patches (WTPs) and riparian reserve areas, and 2) at the landscape level, which includes provincial parks and other large reserve areas that have become part of the NHLB through strategic level processes.

The current status for this measure was derived from a recent ecosystem representation analysis conducted in the Vanderhoof Forest District by Forest Ecosystem Solutions (FES) (2004a). The results of this analysis are listed in Table 7 and also shown graphically in Figure 3.

As shown in Table 7, the FES analysis aggregated Biogeoclimatic Ecosystem Classification (BEC) site series values for the Vanderhoof Forest District into 25 coarse filter ecosystem groups (habitat types) based on relative similarities of their indicator plant communities. Using a netdown process, the forested land base was divided into the NHLB and the THLB. The 25 distinct habitat types were then overlaid onto the NHLB and THLB. A query of hectares within the NHLB and THLB associated with each habitat type was completed.

Table 7. Distinct Habitat Types and Proposed Targets for the Vanderhoof DFA

Broad Ecosystem Group	Coarse Filter Ecosystem Group/Habitat Type ¹	Current Status as of March 31, 2004*	Target (% of total habitat)	Variance	Achieved by
Dry Forest	1 – xeric-subxeric SBPS/SBS	55%	>55%	-5%	Annually
	2 – xeric-subxeric SBSdw	21%	>21%	-2%	Annually
	3 – xeric SBSmc3	50%	>50%	-5%	Annually
	4 – xeric-subxeric ESSF/SBS	32%	>20%	-2%	Annually
	5 – subxeric-submesic SBSdk	21%	>21%	-2%	Annually
Nutrient Poor	6 – subxeric SBS	19%	>19%	-2%	Annually
	7 – submesic-subhygric SBSdw	15%	>15%	-2%	Annually
	8 – submesic-subhygric SBPS/SBSmc	15%	>15%	-2%	Annually
	9 – subhygric-hygric SBS/SBPS	45%	>45%	-5%	Annually
Zonal	10 – subtaesic-mesic SBPS	67%	>67%	-7%	Annually
	11 – submesic-subhygric SBSdk	15%	>15%	-2%	Annually
	12 – submesic-mesic SBSdw	12%	>12%	-1%	Annually
	13 – submesic-mesic SBSmc	11%	>11%	-1%	Annually
	14 – submesic-mesic ESSF	23%	>15%	-2%	Annually
Moist/Rich	15 – mesic-subhygric SBS	20%	>20%	-2%	Annually
	16 – mesic-subhygric SBSdw	20%	>20%	-2%	Annually
	17 – submesic-subhygric-hygric	21%	>21%	-2%	Annually
	18 – subhygric-hygric SBS mc2	32%	>32%	-3%	Annually
	19 – subhygric ESSF	26%	>15%	-2%	Annually
Riparian Forest	20 – subhygric-hygric SBSdk	38%	>38%	-4%	Annually
	21 – subhygric-subhydic SBPS	58%	>53%	-5%	Annually
	22 – subhygric-hygric SBS	39%	>33%	-3%	Annually
	23 – hygric-subhydic ESSF	40%	>40%	-4%	Annually
Subhydic	24 – subhydic SBPS/SBS	100%	100%	-5%	Annually
	25 – subhydic rich SBS	100%	100%	-5%	Annually

*The current status is from the Ecosystem Representation in the Vanderhoof Forest District project report (FES 2004a)

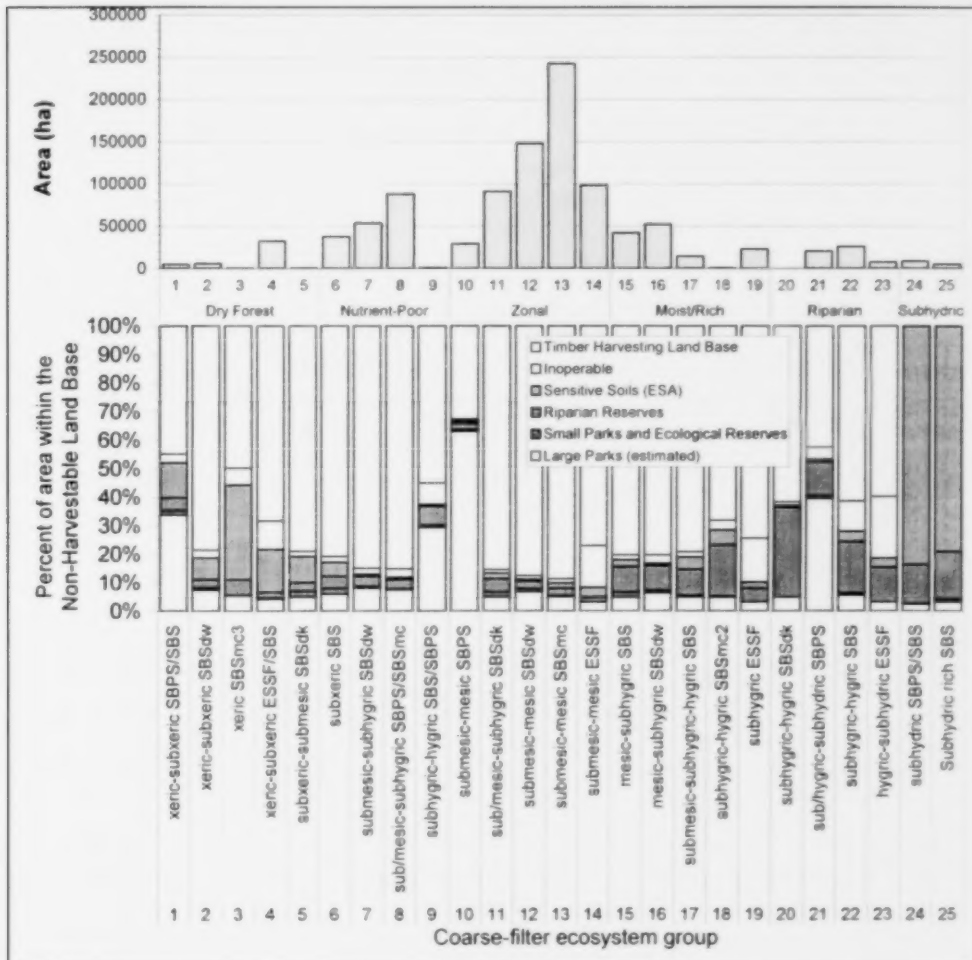
Figure 3 contains two graphical representations, with the first chart detailing the total amount of area within the DFA by each of the 25 distinct ecosystem groups/habitat types. Habitat type 8, 11, 12, 13, and 14 make up a large portion of the DFA. The second chart in Figure 3 shows the amount of total land for each habitat type within the THLB and NHLB. The NHLB is further subdivided by category of unmanaged netdown.

How are targets established?

The baseline targets for each of the 25 distinct habitat types identified in the Vanderhoof DFA were established from a review of the unmanaged portions of land within the DFA (e.g. Parks, Protected Areas, inoperable areas, riparian reserves and sensitive soils, or poor regeneration potential) (Forest Ecosystem Solutions 2004a).

¹ Ecosystem Groups/Habitat types are discussed in the VSFMP PAG Glossary under Biogeoclimatic Ecosystem Classification (BEC) (Appendix I)

Figure 3. Area within Each Distinct Habitat Type and Amount of Total Land in Each Habitat Type



How will this measure be implemented, monitored and reported?

The Licensee Team will continue to plan for unmanaged forests at the stand level (e.g. WTPs, riparian reserves) through individual Site Plans. Licensee Team members will also continue to work with government agencies to promote the designation of large, unmanaged, landscape level reserves. The Licensee Team does not establish Parks or Protected Areas, but has participated in the process of their allocation, mainly through participation on various provincial government land use planning processes.

Licensees maintain and update spatial data coverage of all unmanaged landscape level reserves consistent with land use and boundary designations from provincial agencies. Where significant changes to the designation of reserve areas or inventories have occurred, an automated GIS query will be run to assess performance relative to the stated target. This performance will be assessed and reported annually.

To monitor this measure, reports will be run each year and compared to the overall target. Planners will use the data to review long-term trends in forest development and will adjust practices where necessary.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, distinct habitat types were present throughout the Defined Forest Area, but they were never formally monitored.

b) Implementation of SFMP: Distinct habitat types will be assessed, monitored and conserved throughout the Defined Forest Area. Large, unmanaged, landscape level reserves will be identified or designated at the Forest Development Plan (Forest Stewardship Plan) stage. Smaller, stand level reserves will be designated at the Site Plan stage. Reserve areas will be classified by Biogeoclimatic Ecosystem Classification so they may be attributed to the targets identified in Table 7.

Forecasting and probable trends of measure

This measure was not forecasted by modeling as it was assumed to remain constant over the long term. However, it is important to identify what the accepted target means to SFM. The percent area of distinct habitat types contributes to wildlife habitat for a variety of species and overall biodiversity in the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As all identified targets are listed as values greater than an identified percent, one other scenario should be analysed:

a) What if no distinct habitat types were sustained within the DFA?

If no distinct habitat types were sustained within the DFA, ecological values could be at risk, and these could in turn affect economic and social values. Sustaining biological richness includes conservation of representative ecosystems in order to sustain the natural range of variability of ecosystems across the land base. If distinct habitat types were not conserved, these ecosystems could potentially be lost and the overall diversity of ecosystems in the DFA would decrease. Loss of distinct habitat types could also potentially affect local wildlife populations that are dependent on these ecosystems. Loss of habitat could mean that wildlife would move out of the DFA to other habitat areas, or their survival rate may decrease if other habitat is not available. Decreases in these ecological values could potentially lead to decreases in economic benefits from the forest and result in decreases in social values such as quality of life. Sustaining a proportion of distinct habitat types helps to conserve biological richness and its associated values within the DFA. Within the Vanderhoof DFA, trends for the future will likely show that distinct habitat types will remain constant. It is anticipated that the NHLB will remain mostly static in the long term and the Licensee Team will attempt to supplement the NHLB with THLB area if required and where possible.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IV. Continual Improvement for this measure will involve a review of the effectiveness of this measure in sustaining biological richness in the DFA.

4.2 Snags and Live Trees Retained in Managed Areas

Statement of Measure	Management Objective
1-2.1, 5-1.2 The number of snags and/or live trees per hectare over a prescribed area.	Annually, sustain an average of ≥ 8 snags and/or live trees (-2 variance) per hectare after harvesting. Sustain an average of ≥ 4 snags and/or live trees (-1 variance) per hectare at free growing age.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat type elements and structure important to the maintenance of biological richness are sustained.
- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber forest resources does not decline over time.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity • Element 1.1 – Ecosystem Diversity • Element 1.2 – Species Diversity • Element 1.3 – Genetic Diversity Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits
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What is this measure?

A snag is defined in this SFMP as a standing dead tree, or part of a dead tree, found in various stages of decay, from recently dead to very decomposed (refer to glossary in Appendix II). Snags and/or live trees retained in managed stands as dispersed or clumped retention can provide important habitat for a wide variety of animals during portions of their life cycles.

Residual trees (live or dead) can also be a component of forest stands following a natural disturbance, such as fire or mountain pine beetle infestation. Retention of dispersed and clumped snags and/or live trees in managed stands attempts to emulate the variability of these natural processes by leaving scattered remnants of mature forest across the land base.

Forest stands scheduled for harvest in the DFA tend to be relatively uniform, with smaller tree sizes and fewer dead trees than similar stands in other parts of the province. This is, in part, due to the historic frequency of fires across the landscape, and the relatively young age of most forest stands in the DFA. Stand ages rarely exceed 200 years of age in the Moist Interior Natural Disturbance Unit (NDU) (DeLong 2002), which is the NDU covering the Vanderhoof DFA. DeLong (2002) also reports that very little remnant structure exists in patches of the Moist Interior due to fire, but that densities of smaller snags are higher. This is due to the nature of lodgepole pine to densely inhabit stands after a fire disturbance and then self-thin over time.

(DeLong 2002). Within the Vanderhoof DFA, unsalvaged burns and beetle infestation sites will help to supplement current clumped and dispersed residual tree retention areas.

Current practices and state of measure

A review of current practices indicates that Licensees in the DFA use both dispersed and clumped retention (wildlife tree patches and riparian management areas) techniques to meet the requirements for snag and live tree retention. It is the intent of the Licensee Team to determine the base line, balanced proportion of clumped versus dispersed snags and or live trees with the help of information delivered through this measure. The overall goal is to reach an ecologically suitable balance between clumped and dispersed retention across the DFA over time.

In certain circumstances, Licensees will stub snags and/or live trees at 3-5m in height in order to address safety requirements and to ensure wind firmness. Retention of dispersed snags and/or live trees is a site specific management technique that is determined during the preparation of the site plan. Not all harvested sites will benefit from retention of snags and/or live trees, and in certain circumstances it is not operationally feasible to leave individual stems standing. The following guidelines are currently followed in the DFA and will continue after implementation of this SFMP as long as SFM objectives are being met:

- If forest health or worker safety is a potential concern, this measure will not apply.
- This measure will not apply in blocks less than fifteen hectares in size. Smaller blocks in the sub-boreal forest are often very irregularly shaped, which restricts equipment maneuverability. These blocks typically have forest land in close proximity that will contribute to the retention of habitat elements on the landscape.
- This measure will not apply to areas where steep slopes (>30%) or in narrow fingers of harvested blocks (less than 40 meters wide) that restrict machine maneuverability. These factors may limit the capability to safely and economically stub snags or live trees, or may limit the ability of skidding and site preparation equipment to avoid significantly damaging stubbed trees.
- For areas where cable harvesting or partial cut systems are employed, this measure will not apply.

Licensee Team members will continue to prescribe the retention of snags and/or live trees on a site-specific basis in order to reach DFA target levels.

How are targets established?

Currently data for dispersed stems across the DFA does not exist. The target for this measure is currently set at an arbitrary average, as no specific information is available regarding past practices or performance. Also, relatively little research exists on desired levels of retention in managed forest stands, particularly in the sub-boreal forest even though local experience indicates that significant site diversity and wildlife habitat can be promoted with the retention of residual standing trees on harvested areas. As mentioned previously, not every site will be suitable for retention of snags and/or live trees, so the current target is stated as an average value to be achieved across the DFA harvested land base. A review of licensee's harvested areas is required to determine the current average number of snags and/or live trees per hectare that are retained. While harvesting supervisors currently assess the presence of snag and/or live tree retention in accordance with Site Plans, no information is currently available on actual densities that are retained.

How will this measure be implemented, monitored and reported?

To fully implement this measure local baseline data and scientific analysis is required to determine appropriate amounts and distribution of snags and/or live trees and their ability to provide habitat. Given the current level of mountain pine beetle infestation and historic scientific analysis, the current targets for this measure may be inappropriate. A DFA specific study including a literature review will be completed by March 2006 to update and localize target values.

The average number of snags and/or live trees retained in harvested areas will be determined through surveys that will occur post harvest and at free to grow. The average number of snags and/or live trees will be monitored through these survey results, acknowledging that revisions to the target and prescribed management practices may need to be implemented to achieve SFM targets. Any proposed changes will be introduced to the PAG in order to receive consensus prior to a permanent change being made.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, snags and/or live trees were prescribed in managed stands throughout the Defined Forest Area, but they were never formally monitored after harvest.

b) Implementation of SFMP: Snags and/or live trees will continue to be prescribed through Site Plans. Surveys will be completed post harvest and at the free to grow stage to determine the average number of snags and/or live trees retained in managed stands.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. Maintenance of standing live and/or dead trees contributes to biodiversity of ecosystems through vertical structure on the land base, wildlife habitat for a variety of species, and emulation of natural disturbance patterns. From a review of current literature, it is not entirely certain what effects would occur if residual standing dead and/or live trees were not retained in managed stands. Certain projects, such as a Strategic Plan for Identifying and Maintaining Snags in Managed Forest Stands in the Prince George TSA (2003) have been initiated, but not yet completed with identified results. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. When forecasting a variable in this manner, it is useful to identify two potential scenarios:

- a) What if no residual standing live and/or dead trees were retained within the DFA?
- b) What if ten times the target amount of residual standing live and/or dead trees were retained in the DFA?

The overall perceived value from this measure is assumed to increase with the number of stems retained in managed stands up to a saturation point where this value then begins to level off and positive returns are no longer realized. While it is currently not possible to identify this point of equilibrium on the basis of existing information, assumptions surrounding the above mentioned "what if scenarios" can be made. If no residual standing live and/or dead trees were retained within the DFA, it is anticipated that biodiversity values would decrease, wildlife productivity may decline, natural species diversity would decrease and natural patterns across the landscape

would no longer be represented. On the other end of the spectrum, if three times the target amount of residual standing live and/or dead trees were retained economic values from the timber resource would not be fully achieved. Reforestation and other silviculture activities would also become more costly and less efficient, and forest fire fuel levels would increase across the landscape, especially in consideration of the mountain pine beetle epidemic, as most residual trees left in harvested pine forests would be dead.

In the long-term, failing to achieve the identified target for this measure could reduce the ecological values of forest landscapes, and could also negatively impact economic and social values across the DFA. The above "what if scenario" analysis implies that a balance of values can be achieved through maintenance of a level of residual trees that lies somewhere in between the two scenarios. Although this level has not yet been identified through past experience or through scientific findings, the Licensee Team is committed to achieving the identified target and will strive to continually improve practices, as new information becomes available.

Within the Vanderhoof DFA, trends for the near future will likely show that standing dead trees in managed stands will increase due to the current, mountain pine beetle epidemic. For this measure, once baseline data is collected, other research projects are completed and stands within the DFA are monitored on an annual basis, definite trends for standing live and/or dead trees will be easier to identify.

Measure performance and continual improvement

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IV. This measure and the associated target will be localized and improved subsequent to completion of the DFA specific study and literature review.

4.3 Average Amount of Coarse Woody Debris per Hectare

Statement of Measure	Management Objective
1-2.2, 5-1.1 The average amount of coarse woody debris per hectare on prescribed areas.	Sustain ≥ 4 logs per hectare (0 logs per hectare variance) after harvesting. This will be monitored annually.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.
- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber resources does not decline over time.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity

- Element 1.1 – Ecosystem Diversity
- Element 1.2 – Species Diversity

Criterion 5 – Multiple Benefits to Society

- Element 5.1 – Timber and Non-timber Benefits

What is this measure ?

Coarse woody debris (CWD) is defined in this SFMP as sound or rotting logs and branches (stumps as well if specified) of a minimum diameter or greater, either resting on the forest floor or at an angle to the ground of 45 degrees or less (refer to glossary in Appendix II). CWD content in the Vanderhoof DFA is calculated in conjunction with FRPA requirements using material that is greater than 7.5cm in diameter at one end. This SFMP also defines CWD as providing habitat for plants, animals and insects, and as providing a source of nutrients for soil development. Therefore, maintenance of CWD across the DFA, within natural ranges of variability, will help to provide for various habitat needs of numerous organism and will also help to promote higher biodiversity levels in managed areas.

Specific retention levels will be targeted in harvested areas even though there is often an economic incentive to minimize debris that is left behind on site. Removal of logging debris can be detrimental if the habitat needs of organisms are compromised. The occurrence of CWD following harvest activities also serves as an indicator of the ability of the ecosystem to recover from disturbance. The CWD levels that exist within wildlife tree patch and riparian retention areas, unsalvaged burns, or unsalvaged mountain pine beetle sites within the DFA will also serve to compliment CWD levels retained within harvested blocks.

Current practices and state of measure

The current performance standard for blocks harvested in the DFA is to follow the guidance of the provincial wide CWD strategy as defined in "A Short-term Strategy for Coarse Woody Debris Management in British Columbia's Forests", March 2000. The objectives within this strategy include maintaining small, dispersed CWD piles where appropriate, providing a range of decay and diameter class CWD, and providing a supply of both coniferous and deciduous CWD. This strategy also recommends utilizing standing dead trees or creating stubbed trees for both CWD and wildlife habitat inputs. Finally, the strategy suggests management of the composition and disbursement of CWD and wildlife trees in order to reduce impacts from danger trees, wildfire and forest pest or forest disease hazards. It is anticipated that current levels of CWD in the DFA exceed the stated target for this measure. However, firm data surrounding this target has not been collected in the past. Through this SFMP, monitoring and reporting measures will be developed and implemented to ensure the target is achieved and supported through documented data collection.

How are targets established?

Targets for CWD in the Vanderhoof DFA were identified based on the standard within Section 68 (1) of the Forest Planning and Practices Regulation of FRPA. This target will be used as a default value until localized targets for the DFA can be produced. CWD retention for a harvested block is prescribed through a Site Plan. It is recognized that a range of CWD levels and piece sizes is desirable, and it is expected that this will be achieved with specific direction from each individual Site Plan document.

How will this measure be implemented, monitored and reported?

Post harvest CWD levels will be measured and recorded within a sample of blocks through a survey after harvest is complete. This measurement will provide a block average value that will be tracked by each licensee. The average amount of CWD present in blocks throughout the DFA will be monitored from reports generated by each Licensee Team member. After analysis of the results from monitoring, revisions to targets and prescribed management practices may need to be implemented in order to achieve SFM objectives.

Management Modification and Link to Operational Plans:

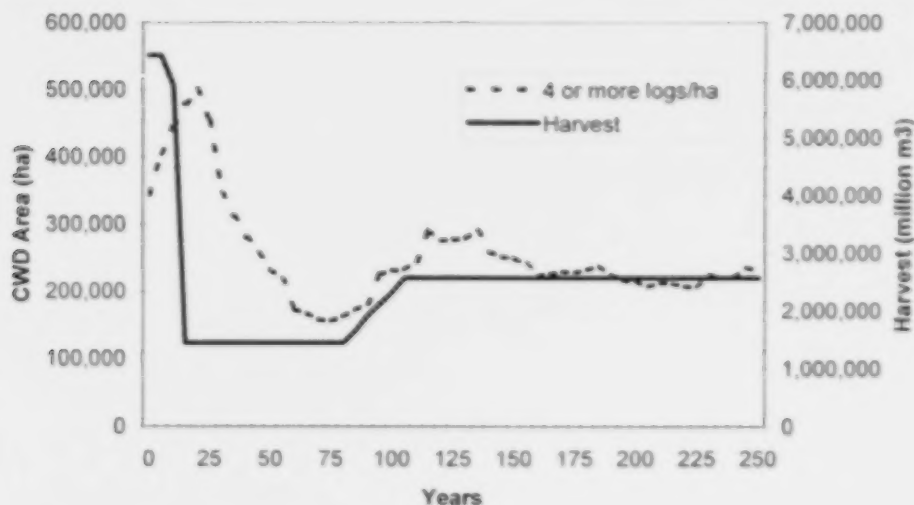
a) Status Pre-SFMP: Prior to the development of this SFMP, coarse woody debris strategies were prescribed for managed stands throughout the Defined Forest Area, but never formally monitored after harvest.

b) Implementation of SFMP: Coarse woody debris will continue to be prescribed through Site Plans and will be monitored after harvest through a survey conducted on a sample of harvested blocks to determine the average amount of coarse woody debris retained in managed stands.

Forecasting and probable trends of measure

Forecasting of CWD was carried out by linking stand level growth and yield curves to snag and downed log curves (Logs being snags that fall down over time). Due to the limitations in the snag and log model, forecasting assumed that harvesting operations do not retain snags at the time of harvest. This is contrary to current operational practice and led to the underestimation of coarse woody debris over time.

Figure 4. Area Predicted to have 4 or more logs/ha of Coarse Woody Debris in the Timber Harvesting Land Base.



*Note: This forecast assumes that no CWD is left after harvesting underestimating the CWD over time.

Figure 4 illustrates the forecast of CWD over time in the timber harvesting land base (THLB). Note that the high mortality of pine stands due to the mountain pine beetle epidemic results in a significant increase of coarse woody debris in the short-term.

As can be seen in Figure 4, the predicted CWD area containing more than 4 logs per hectare without any operational CWD input generally follows the harvest forecast. The amount of CWD increases from the beginning of the planning horizon due to the existing dead and/or dying pine stands; dead trees become snags and eventually fall down to form logs. CWD reaches its peak at year 20, after which the amount of CWD is predicted to decrease and reach its lowest level at around 75 years. After this, the naturally regenerated pine stands that were killed by the mountain pine beetle start again recruiting snags and logs, which shows in the graph as a sharp increase in the amount of CWD between year 100 and year 125. In the long term, the area of the THLB that is predicted to have 4 or more logs per hectare stabilizes at around 200,000+ hectares or approximately 25% of the THLB.

The forecast shows that even in the absence of operational snag and CWD retention a significant amount of CWD is naturally produced. As this measure currently has a target to leave 4 or more logs/ha, the total area of the THLB containing more than 4 logs per ha is likely to be higher than the forecast shown in Figure 4, particularly in the medium and long term.

Measure performance and continual improvement

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The current target reflects the present legislative default, which is likely underestimated and not specific to the Vanderhoof DFA. As such, this measure and associated target have been identified as an area of continual improvement. Localized baseline data and further knowledge CWD implications will allow the Licensee Team to make necessary adjustments over time to achieve SFM across the DFA.

4.4 Riparian Reserves

Statement of Measure	Management objective
1-2.3, 1-4.1 The percent conformance with riparian reserve zone strategy/standards.	Annually, 100% (-5% variance) conformance with riparian reserve zone strategy/standards.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat elements and structure important to maintain biological richness are sustained.
- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Water resources are sustained by maintaining quality and quantity.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity

- Element 1.2 – Species Diversity

Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity

- Element 2.2 – Ecosystem Productivity

Criterion 3 – Conservation of Soil and Water Resources

- Element 3.2 – Water Quality and Quantity

What is this measure?

Riparian areas occur next to the banks of streams, lakes and wetlands and include both the area covered by continuous high moisture content and the adjacent upland vegetation. Riparian Management Areas (RMAs) consist of a Riparian Management Zone (RMZ) and where required by legislation, a Riparian Reserve Zone (RRZ) (refer to glossary in Appendix II under Riparian Management Area, Figure 1). The width of these zones is determined by attributes of streams, wetlands, lakes, and adjacent terrestrial ecosystems. Maintaining RMAs provides for the conservation of riparian and aquatic environments, which are key for the survival of species (flora and fauna) that are dependent on riparian conditions. RMAs frequently contain large numbers of flora and fauna species and provide for critical habitats, home ranges and travel corridors for wildlife. In addition, RMAs also function to conserve water quantity and quality features by reducing the risk induced by forest harvesting activities directly affecting the watercourses.

A Site Plan is completed prior to harvest for most areas within the DFA. Site Plans specify the type of riparian features present within a proposed harvest area, the size of the RMA (which includes the RRZ where applicable), and a prescription for specific activities within the RMZ to protect water quality and habitat values. The RRZ, if required, is immediately adjacent to the stream and is maintained as a no-harvest zone. RRZs are proposed and implemented in cutblocks and road construction areas, but they also continue in existence after harvest until a mature stand is re-established. This measure will ensure that the RRZ that exists after harvesting activities is consistent with what was prescribed in the Site Plan or road construction design, and will therefore provide an indication of water quality conservation and habitat for flora and fauna species.

Current practices and state of measure

Currently, all streams, wetlands, and lakes adjacent to harvested areas are classified during site level plan preparation. Riparian management objectives are set and described within the Site Plan or road design for the proposed harvest area. Under the various licensees' EMS, pre-work forms are completed prior to harvesting to review all applicable RMA objectives, including RRZ direction. Licensees also complete harvest inspections for all harvested areas to ensure all riparian aspects contained in Site Plans are implemented in the field. Base line data for this measure was established from a review of practices from April 1, 2003 to March 31, 2004. A review of Licensee Team member's final inspection forms indicates that 98% of all RRZs were implemented in conformance with the Site Plan.

How are targets established?

The target value for this measure was developed from a review of past practice and performance within the DFA. The target value of 100% (-5% variance) is set to ensure that all riparian management practices, specifically RRZ designation and management, continue to remain consistent with the Site Plan.

How will this measure be implemented, monitored and reported?

As previously mentioned, all streams, wetlands and lakes in or immediately adjacent to a planned harvest area are classified in the field prior to the commencement of operations. RRZs must meet or exceed the RRZ widths noted in the Site Plans. Current practice when establishing reserve boundaries in the field on S1, S2 and S3 streams (refer to glossary in Appendix II under stream class) is to utilize natural topographic breaks and timber type boundaries, which will result in cutblocks with irregular shaped edges. In practice, buffer widths are normally wider than the minimum, but they vary significantly in distance from the stream based on the natural breaks that are typically used for the boundary. Boundaries located along naturally occurring features are usually more windfirm than fixed width RRZs and easier to implement, which makes this practice the preferred strategy for delineating RRZs in the field.

Inspections will continue to be completed on harvesting activities, and information on any non-conformance issues will be noted and tracked through incident tracking systems or other means. Annual reports will summarize the number of conformance issues identified, specifically identifying any incidents involving RRZs.

The location, classification and RRZ requirements of water bodies (where applicable) will be included on site level plan maps. Site specific requirements will be identified for the protection of reserve zones, and management practices will be included in Site Plans where applicable. Pre-works completed prior to harvesting activities will review RRZ size, location and any site specific protection measures prescribed.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, riparian reserve zone strategies were developed and adhered to, but this activity was never formally monitored or reported out.

b) Implementation of SFMP: Riparian reserve zones will continue to be documented at the Site Plan stage. Final harvest inspections will also continue to be conducted where riparian reserve zone conformance with Site Plan strategies will be confirmed. Non-conformance issues will be noted during these inspections and will be entered into an incident tracking database. Annually, non-conformances will be reported in the SFMP annual report.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame, as it is operational in nature. However, it is important to identify what the accepted targets mean to SFM. In order to forecast this measure, a "what if scenario" analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if scenario" consists of one scenario as the current target is set at 100%:

- a) What if only 50% of blocks with Riparian Reserve Zones were implemented in conformance with the Site Plan?

If only 50% of blocks with Riparian Reserve Zones were implemented in conformance with the Site Plan ecological values such as water quantity and quality, and stand level retention could be compromised. Riparian Reserve Zones are an important part of forest management because they can impact many other forest resource values that are important to the DFA. RRZ's act as a buffer for a water body, thereby conserving the aquatic habitat of water dwelling species, such as

shade requirements and water temperature. This buffer can also help to protect water quantity and quality values by promoting stream bank stability near the water body within the reserve. RRZ's can also contribute to overall biodiversity as they contribute to stand level retention, which in turn promotes wildlife habitat across the DFA. If only 50% of RRZs were implemented across the DFA, a significant portion of riparian habitat would be lost, water quantity and quality could potentially decrease and stand level retention would decrease. These impacts could, in turn, influence certain economic and social values in the DFA. Such values include potential increases to timber supply by utilizing wood that would otherwise be retained, potentially reduced recreation value from activities such as fishing, and potentially reduced quality of life values from the public's desire for good water quality in the Vanderhoof area.

As well as being an important measure for SFM, RRZs are also a legislative requirement that must be achieved unless other direction is approved by government. The Licensee Team is committed to achieving the stated target for this measure and long term trends are anticipated to show that 100% of RRZs are implemented as prescribed through Site Plans.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual improvement will involve ongoing review of performance and the EMS will be adjusted where required as tied to pre-works, inspections, and training.

4.5 Proportion of Shrub Habitat by NDU

Statement of Measure	Management Objective
1-2.4 The proportion of shrub habitat (%) by Natural Disturbance Unit.	Sustain 5.7% (-0.5% variance) shrub cover by Natural Disturbance Unit. This will be monitored every 5 years.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity

- Element 1.1 – Ecosystem Diversity
- Element 1.2 – Species Diversity
- Element 1.3 Genetic Diversity

Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity

- Element 2.2 – Ecosystem Productivity

What is this measure?

Shrubs are perennial, woody stemmed plants that are generally multi-stemmed from the ground (Brayshaw 1996). Shrubs vary in height and are further defined in the Vegetation Resource

Inventory (VRI) as either shrub low (SL) or shrub tall (ST). Shrubs occur naturally in forested areas, as well as in natural openings. Young, natural forest or harvested areas less than 20 years old are also considered to contribute to shrub habitat in the DFA.

Site productivity is a good indication of potential shrub abundance. Richer, moister sites tend to have higher shrub content than drier, poorer sites, but this is not always the case. Shrubs grow well in openings, are naturally common in riparian areas and inhabit disturbed areas in early stages of succession. Once the forest matures and the stand closes, shrubs begin to be suppressed by the taller trees and they often become uncommon in stands with a high crown closure until the stand naturally opens.

As part of the natural landscape, shrubs contribute to overall biodiversity. They play a part in nutrient cycling, they help to retain soil stability, and they are a component of habitat for various wildlife and bird species. Bunnell, Kremsater and Wind (1999) found that many bird and mammal species respond positively to shrub abundance for breeding and feeding purposes. Shrubs are not considered crucial for wildlife habitat, but many species are dependent on shrub habitats for some part of their life requisites.

Current practices and state of measure

Up until now, shrub information within the Vanderhoof DFA was not previously collected. For this measure, shrub cover was identified throughout the DFA from a report entitled SFM Indicator Mapping for the Vanderhoof Forest District completed by Forest Ecosystem Solutions (FES) (2004b), and is summarized in Table 8. This report estimated current shrub condition by analysing crown closure and seral stage attributes of each forest stand within the DFA. Although this measure states shrub information will be separated by NDU, there is only one NDU present in the DFA. Each NDU/merged BEC (mBEC) zone contains different shrub amounts based on several factors including climate, soil conditions, site productivity and growing season. As identified in Table 8, the NDU/mBEC zones of the DFA have a range of shrub cover from 4.2% to 10.6%. Overall, an average of 5.7% currently exists throughout the DFA and this value will be maintained in the future.

Table 8. Current Shrub Habitat in the Vanderhoof Defined Forest Area

Natural Disturbance Unit	Merged Biogeoclimatic Units	Current Status as of March 31, 2004* (ha)
D1 Moist Interior Mountain	ESSF mv1, ESSF mvp1, ESSF xv1	6.7%
D2 Moist Interior Plateau	SPBS mc	10.6%
D3 Moist Interior Plateau	SBS dk	5.9%
D4 Moist Interior Plateau	SBS dw2	4.2%
D5 Moist Interior Plateau	SBS dw3	4.9%
D6 Moist Interior Plateau	SBS mc2, MS xv	5.5%
D7 Moist Interior Plateau	SBS mc3	6.3%
Average Shrub Cover		5.7%

* The current status is from the SFM Indicator Mapping for the Vanderhoof Forest District project report (FES 2004b)

How are targets established?

The target was established based on the DFA wide average taken from the current condition in each NDU/mBEC unit (refer to Table 8). The target is based on current condition of shrub cover within the DFA, as derived from VRI, which is the best available information at this time. The amount of naturally occurring, shrub area and all forested areas less than 20 years old for each

NDU/mBEC unit in the DFA was reviewed in order to obtain this data. NDU/mBEC units with low levels of naturally occurring shrubs generally have lower targets than areas with naturally higher levels of shrubs.

How will this measure be implemented, monitored and reported?

Young forest less than 20 years old can provide important shrub habitat, and this can be created through harvesting. Harvesting and silviculture practices in the DFA will influence the abundance and distribution of shrubs over time. This should emulate natural processes associated with stand initiating events. Long-term monitoring of shrub abundance change within managed stands will occur through analysis of updates to the current Vegetation Resources Inventory (VRI). As VRI is updated, it is expected that current condition of shrub habitat across the DFA will be reported approximately every five years.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, shrub habitat was present throughout the Defined Forest Area, but was never formally monitored.

b) Implementation of SFMP: Initial data for this measure was identified from a report of ecosystem representation in the Vanderhoof Forest District completed by Forest Ecosystem Solutions. Shrub cover was estimated through an analysis of crown closure and seral stage attributes of each forest stand in the Defined Forest Area. Future shrub habitat will be monitored and reported through the use of the Vegetation Resources Inventory (VRI).

Forecasting and probable trends of measure

Forecasting was completed for this measure by tracking the proportion of forest stands less than 20 years old over the full 250 year planning horizon. This measure represents early seral shrubs within the DFA with the following assumptions:

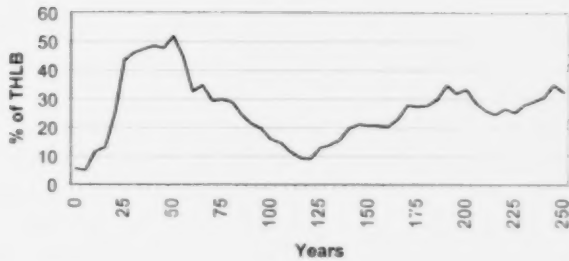
- In the ESSF, shrub species are assumed to be *Vaccinium* species
- In the SBS and SPBS shrubs are assumed to be *Vaccinium* and *Rubus* species.
- Site conversion or brush rehabilitation was not included in the forecasting analysis.

Figure 5 shows a future forecast for each of the defined NDU/mBEC units.

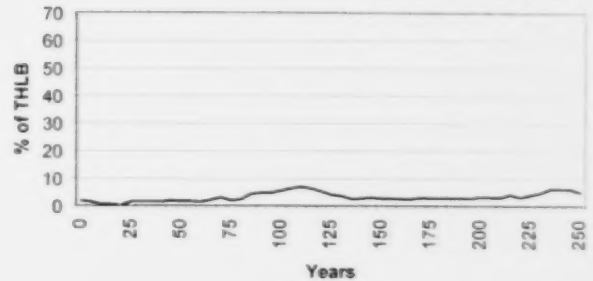
All of the charts located in Figure 5, with the exception of one (NDU 2, SPBS mc), show the same general trend. There is an increased harvest at the beginning of the planning horizon, which in turn creates large early seral areas and correspondingly early seral shrub habitat. In the midterm, reduced harvest levels lead to reduced early seral areas and in the long term there is generally an increase in the shrub area due to a higher harvest level. It should also be noted that the fluctuation in the long term within each NDU/mBEC unit is caused by different harvest levels that occur over time within each of these units.

Figure 5. Early Seral Shrub Area by Natural Disturbance Unit and Merged BEC zone for the Vanderhoof Defined Forest Area

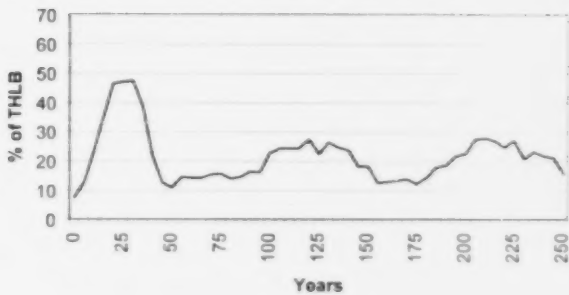
Early Seral Shrub Area, ESSF mv1, ESSF mvp1, ESSF xv1, SFM Scenario



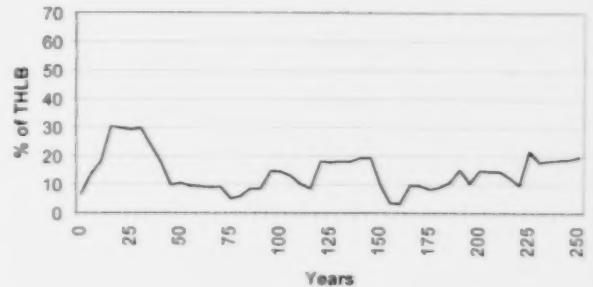
Early Seral Shrub Area, SPBS mc, SFM Scenario



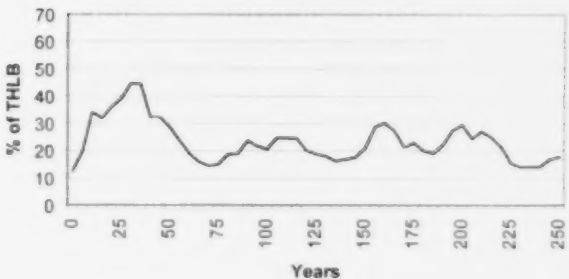
Early Seral Shrub Area, SBS dk, SFM Scenario



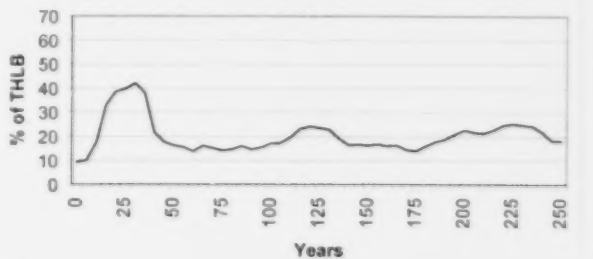
Early Seral Shrub Area, SBS dw2, SFM Scenario



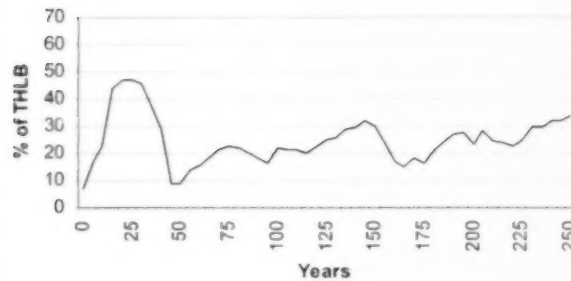
Early Seral Shrub Area, SBS dw3, SFM Scenario



Early Seral Shrub Area, SBS mc2, MS xv, SFM Scenario



Early Seral Shrub Area, SBS mc3, SFM Scenario



NDU 2, SPBS mc shows very low levels of shrubs. This is caused by two factors:

1. Very little harvest is forecast for this NDU/mBEC unit due to poor site productivity.
2. Poor site types represent approximately 84% of NDU 2. These are not expected to accumulate much in the way of shrub biomass even at young ages due to low soil nutrient levels. Therefore, the vegetation potential following disturbance on these sites is low.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team has identified that the method of data capture for this measure may be an area for continual improvement. The idea of incorporating shrub habitat information into silviculture surveys will be explored as a potential data collection method in the future.

4.6 Deciduous Tree Species

Statement of Measure	Management Objective
1-2.5 The proportion of deciduous species (%) by NDU.	Sustain 4.9% (-0.5% variance) deciduous species by NDU. Monitor every 5 years.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat elements and structure important to maintain biological richness are sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 1 – Conservation of Biological Diversity</p> <ul style="list-style-type: none"> • Element 1.2 – Species Diversity |
|---|

What is this measure?

This measure indicates the proportion of deciduous trees in the DFA by comparing the amount of forested area covered by deciduous trees in the Vegetation Resources Inventory (VRI) to those areas that are occupied by coniferous tree species.

Though not often considered of economic importance, deciduous tree species are important to the ecological balance of forest ecosystems. Deciduous tree species will often occur in early successional stands and provide numerous functions including habitat for various wildlife species and contribution of nutrients to forest soils. Stands of deciduous trees provide three broad resources to forest dwelling organisms: foraging sites, places to rear young (including cavity sites), and substrate for non-vertebrates. They provide these resources in a different manner than conifers due to differences in the leaves, bark and wood of deciduous trees. Both vertebrate and non-vertebrate species respond positively to these differences.

As forests progress through successional stages, the deciduous component will eventually decline as these stands are generally replaced by coniferous stands through time. However, the deciduous that begins to die off will contribute to other important ecosystem elements such as coarse woody debris and other habitat structures (e.g. standing wood debris). In contrast, harvesting and other disturbance activities often initiate the growth of new deciduous stands. Throughout the successional stages of forest ecosystems, the ecological functions of deciduous tree species change spatially and temporally, but are important for maintaining the natural diversity of flora and fauna.

Forest operations, including harvesting and silviculture activities, have a dramatic influence over the composition of tree species occurring on managed landscapes. In order for entire ecosystems to function effectively and maintain their ability to recover from disturbances (e.g. forest harvesting activities), it is necessary to maintain the natural diversity of tree species. Tree species provide the basic requirements and fundamental habitat for fauna, and contribute to the recycling of nutrients and other life sustaining elements necessary to sustain the productive capacity of the ecosystem. Within the Vanderhoof DFA, harvesting is not currently targeted toward deciduous leading stands.

Current practices and state of measure

Currently, within the DFA, no deciduous leading stands are harvested. Through harvesting, early seral stages are created, which allows for in-growth of deciduous components.

Wildlife tree patches and riparian reserves have been established within harvest areas since 1996 at an approximate ratio of 8% of reserve area per hectare of harvested area. Established wildlife tree patches and riparian reserves provide mixtures of tree species including deciduous trees.

The current status of deciduous leading stands by NDU/mBEC unit and percent composition of these stands in comparison to the THLB is shown in Table 9 on the following page. Each NDU/mBEC unit contains different and varying amounts of deciduous tree cover based on the particular sites present within each NDU/mBEC category. Therefore, this measure is monitored and reported as a DFA wide total. As stated in Table 9, the percentage of deciduous stands ranges from 0.04% to 2.17% in each of the NDU/mBEC categories. Overall, the average deciduous component within the DFA is 4.9%.

How are targets established?

The baseline target was determined through a deciduous tree species query of the existing VRI data. Deciduous leading stands were converted to a hectare basis for each NDU/mBEC unit and then summed for the entire DFA (see Forest Ecosystems Solutions 2004b). As stated in Table 9, the percentage of deciduous stands ranges from 0.04% to 2.17% in each of the NDU/mBEC categories. The current deciduous component within the DFA is used as the target (4.9%) and this value will be sustained across the DFA in the future.

How will this measure be implemented, monitored and reported?

The main data source for monitoring deciduous tree species composition is VRI data. These data sources are usually only updated or replaced at periodic intervals (i.e. every five years). To monitor this measure, reports will be run every five years and compared to the overall target.

Table 9. Deciduous Tree Species within the Defined Forest Area

NDU	Merged Biogeoclimatic Units	Current Status March 31, 2004 (ha)	Deciduous Stand Percentage (based on THLB of 834,242 ha)
D1 – Moist Interior Mountain	ESSF mv1, ESSF mypl, ESSF xv1	303	0.04
D2 – Moist Interior Plateau	SPBS mc	427	0.05
D3 – Moist Interior Plateau	SBS dk	13,485	1.62
D4 – Moist Interior Plateau	SBS dw2	2,064	0.25
D5 – Moist Interior Plateau	SBS dw3	18,098	2.17
D6 – Moist Interior Plateau	SBS mc2, MS xv	3,834	0.46
D7 – Moist Interior Plateau	SBS mc3	2,459	0.30
TOTAL Deciduous in the DFA	All	40,670	4.89

Management Modification and Link to Operation Plans:

a) Status Pre-SFMP: Historically, deciduous stands have not been harvested and therefore managed, but they have also not been formally monitored.

b) Implementation of SFMP: The current status of deciduous leading stands in the Defined Forest Area was determined through a query of existing Vegetation Resources Inventory information for the Vanderhoof Forest District. Future presence of deciduous leading stands within the Defined Forest Area will also be monitored and reported through the use of the Vegetation Resources Inventory (VRI).

Forecasting and probable trends of measure

This measure was not forecasted by modeling, as there was no appropriate data set available at the time of the scenario analysis. However, it is important to identify what the accepted target means to SFM. The proportion of deciduous species by Natural Disturbance Unit (NDU) is a

measure that could affect wildlife habitat for a variety of species and overall biodiversity in the DFA. Therefore, the use of a “what if scenario” is beneficial in identifying anticipated future trends for a measure such as this. As this measure speaks to deciduous leading stands within the DFA, and currently the Licensee Team does not harvest deciduous leading stands, it can be assumed that all deciduous leading stands are sustained. Therefore, one other scenario should be analysed:

a) What if no deciduous leading stands were sustained within the DFA?

If no deciduous leading stands were sustained within the DFA, ecological values could be at risk, and these could in turn affect economic and social values. Sustaining biological richness includes conservation of representative stand types in order to sustain the natural range of variability of ecosystems across the land base. If deciduous leading stands were not conserved, ecosystems could potentially be altered and natural variation in the DFA could decrease. Loss of deciduous leading stands could also potentially affect local wildlife populations that are dependent on these habitat types. Loss of habitat could mean that wildlife would move out of the DFA to other habitat areas, or their survival rate may decrease if other habitat is not available. Decreases in ecological values such as ecosystem representation and wildlife could potentially lead to decreases in economic returns from the DFA and decreases in social values due to reduced quality of life.

Sustaining a proportion of deciduous leading stands helps to conserve biological richness and its associated values within the DFA. Within the Vanderhoof DFA, trends for the future will likely show minor upward and downward pressures on the amount of deciduous forest within the DFA. However, the overall proportion should remain constant over the long-term and the Licensee Team will strive to meet the stated target.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The current target is based on deciduous leading stands and therefore may under-represent the actual amount of deciduous tree species within the DFA. The current target also does not provide estimates of deciduous in-growth post harvest. Continual improvement for this measure may involve inclusion of minor components of deciduous species by NDU/mBEC.

4.7 Minimum Proportion of Late Seral Forest in the DFA

Statement of Measure	Management Objective
1-2.6 The minimum proportion of late seral forest (%) by NDU.	Sustain proportions of late seral forest (%) by NDU in accordance with Table 10.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity • Element 1.1 – Ecosystem Diversity
Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity • Element 2.2 – Ecosystem Productivity

What is this measure?

This measure can be considered a “state of the forest” measure because it portrays the percentage of the landscape that is represented by older age classes (late seral). Late seral forest is generally defined across the DFA as greater than 120 years of age for both coniferous and deciduous stands in the Moist Interior NDU. Emphasis is generally placed on late seral forest when it comes to retention, but it is important to note that forests occurring in different seral and structural stages over space and time are recognized as a vital part of the landscape with regards to biodiversity values. Forest management, through the harvest of stands, affects the distribution of seral stages across the landscape. Forest stands are often regenerated and then planned for harvest again in a time span (rotation) that is usually less than the age that they would have matured and grown old naturally. Therefore, over an entire rotation, forest management can reduce the availability of late seral forest stands beyond the limits of natural variability. DeLong (2002) has estimated the natural range of variation regarding late seral forest for different NDUs within the Vanderhoof DFA. As such, landscape biodiversity can be conserved within these defined natural ranges of variation by maintaining a representation of late seral forest across the DFA.

Current practices and state of measure

The Landscape Objective Working Group (LOWG), which has representation from MSRM, MOF and timber licensees is currently developing landscape biodiversity objectives and old forest retention requirements for the Prince George Forest Region, which includes the Vanderhoof DFA. These objectives utilize NDU research conducted by DeLong (2002), and as such, old forest retention objectives have been established for each NDU that occurs within the Vanderhoof DFA. This initiative is not currently practiced in the DFA, but the process has collected substantial data regarding forests in the Vanderhoof District. As such, the current status of late seral forest within the DFA exceeds the minimum levels required as determined through the LOWG (refer to Table 10). Minimum levels of old seral have been used as the basis for the targets identified for this measure so it is apparent that harvesting activities can continue throughout the DFA as long as levels of old seral are closely monitored to ensure the targets are

continually achieved or exceeded. Once the LOWG process is implemented across the DFA, this measure will be more carefully monitored and reported through this process.

Table 10. Late Seral Forest in the DFA and Associated Targets

Natural Disturbance Unit	Merged Biogeoclimatic Units	Current Status as of March 31, 2004* (ha)	Target (%)	Target Non-pine Leading (%)	Variance (%)	Forecasting Results (ranging over 260 years)
D1 Moist Interior Mountain	ESSF mv1, ESSF mvp1, ESSF xv1	46.1%	>29%	>16%	0%	21.6% - 41.7%
D2 Moist Interior Plateau	SPBS mc	31.3%	>17%	>3%	0%	15.2% - 70.1%
D3 Moist Interior Plateau	SBS dk	36.3%	>17%	>5%	0%	13.4% - 33.1%
D4 Moist Interior Plateau	SBS dw2	31.6%	>12%	>2%	0%	10.5% - 31.9%
D5 Moist Interior Plateau	SBS dw3	34.7%	>17%	>5%	0%	15.8% - 31.3%
D6 Moist Interior Plateau	SBS mc2, MS xv	42.4%	>12%	>3%	0%	12.0% - 41.5%
D7 Moist Interior Plateau	SBS mc3	32.2%	>12%	>2%	0%	10.8% - 33.2%

* The current status is from the LOWG Analysis Project (2004)

The mountain pine beetle epidemic is an important DFA specific factor currently affecting late seral pine stands. Mortality from the mountain pine beetle and increased harvest levels applied to the DFA to combat the beetle both contribute to potential future gaps of late seral forest.

How are targets established?

As previously mentioned, targets for this measure were adapted from the minimum levels of old seral forest established through the LOWG process.

How will this measure be implemented, monitored and reported?

Once the LOWG process is implemented, monitoring of this measure will occur primarily through the LOWG Licensee Implementation Team. This group will meet annually to determine if any NDU/mBEC units for the Prince George TSA are approaching old seral targets. Although the LOWG group will meet on an annual basis, the analysis will be completed as required depending on risk to old seral targets. As this analysis occurs over the entire TSA, the Vanderhoof DFA will be included. The results of the LOWG analysis, other analyses of late seral forest, and any actions that may be required to remain above the identified targets will be reported to the PAG on an annual basis.

Management Modification and Link to Operational Plans:

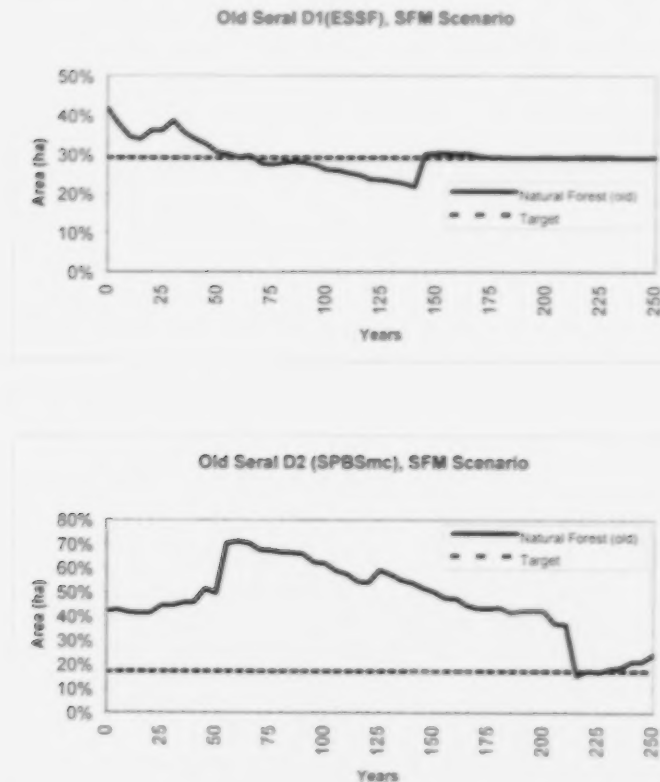
a) Status Pre-SFMP: Prior to the development of this SFMP, late seral forest was present throughout the Defined Forest Area, but it was never formally monitored.

b) Implementation of SFMP: The current status of late seral forest in the Defined Forest Area was determined through the Landscape Objective Working Group (LOWG) Analysis Project using data for the Vanderhoof Forest District. Landscape Biodiversity Objectives for the Prince George Timber Supply Area were formally established on October 20, 2004 by the Regional Director of the Northern Interior Region of the Ministry of Sustainable Resource Management. The Order establishes aspatial objectives for old forest retention, old interior forest condition and young patch size distribution. Therefore, the future status of late seral forest will be monitored through the implementation and adherence to the Landscape Biodiversity Objectives Order.

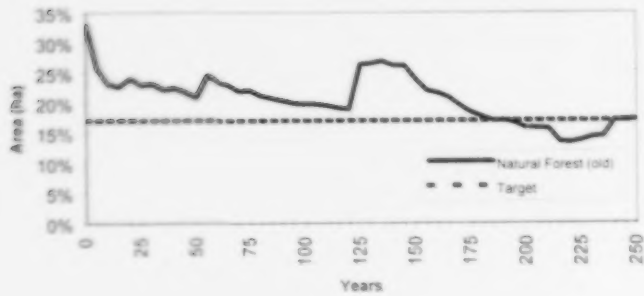
Forecasting and probable trends of measure

Figure 6 shows several charts that illustrate the forecasted trends for late (old) seral forest in the DFA. The forecasting assumption followed what was assumed in the LOWG process, which is that old dead pine stands were considered late seral in the forecast.

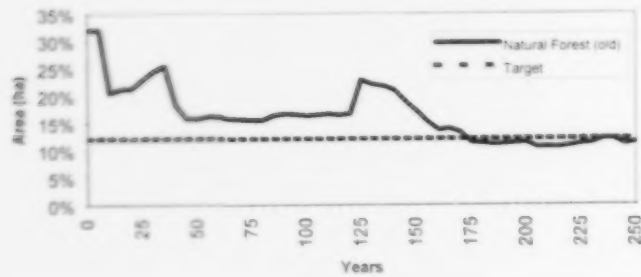
Figure 6. Late (Old) Seral Forest by Natural Disturbance Unit and Merged BEC Zone in the Vanderhoof Defined Forest Area



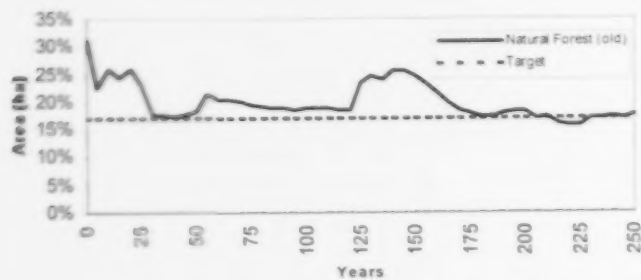
Old Serai D3(SBSdk), SFM Scenario



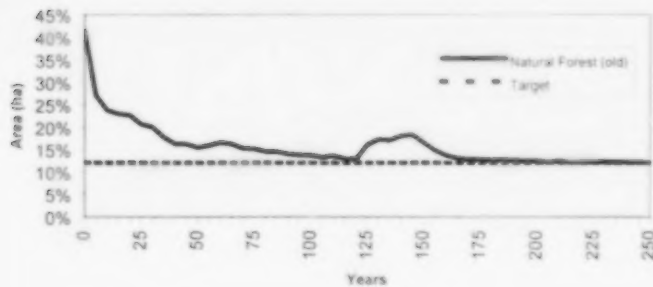
Old Serai D4(SBSdw2), SFM Scenario



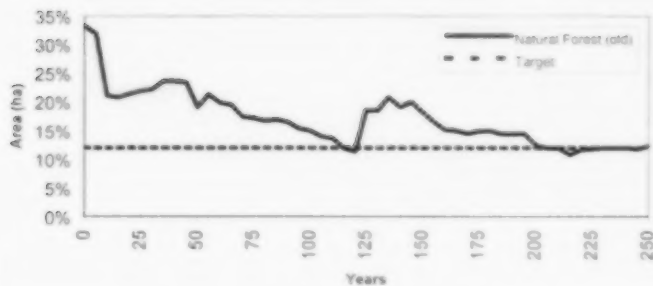
Old Serai D5(SBSdw3), SFM Scenario



Old Seral D6 (SBSmc2, MSxv), SFM Scenario



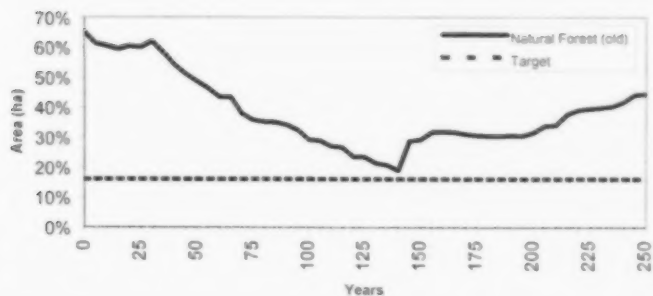
Old Seral D7 (SBSmc3), SFM Scenario



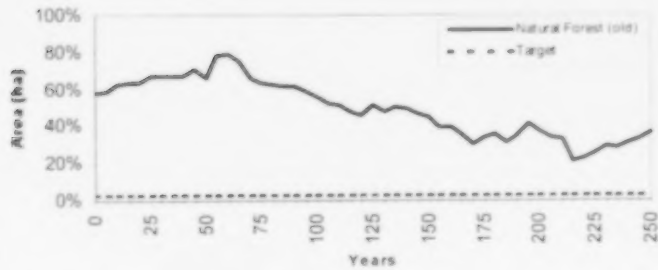
Old dead pine stands were considered old in this forecast analysis. Therefore, it was necessary to ensure that there is a contribution to late seral from stands that are not pine-leading. The following charts in Figure 7 illustrate the targets and corresponding forecast for late seral non pine-leading stands.

Figure 7. Late (Old) Seral Forest, Non-pine Leading, by Natural Disturbance Unit and Merged BEC Zone in the Vanderhoof Defined Forest Area

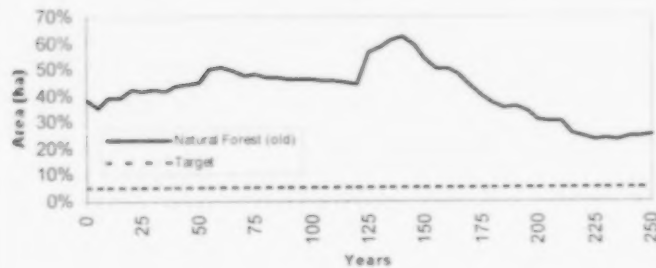
Old Seral Non-Pine D1(ESSF), SFM Scenario



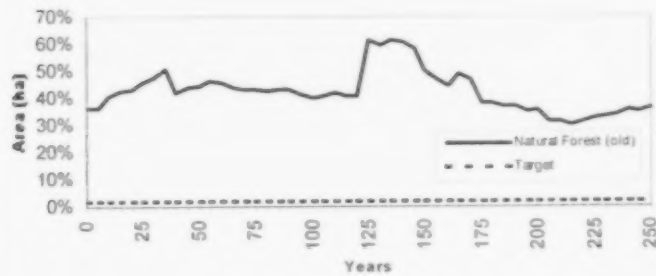
Old Seral Non-Pine D2 (SPBSmc), SFM Scenario



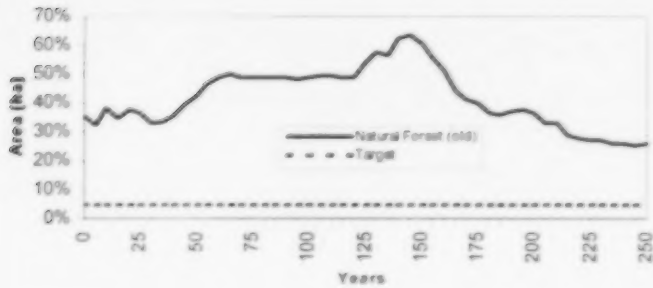
Old Seral Non-Pine D3 (SBSdk), SFM Scenario



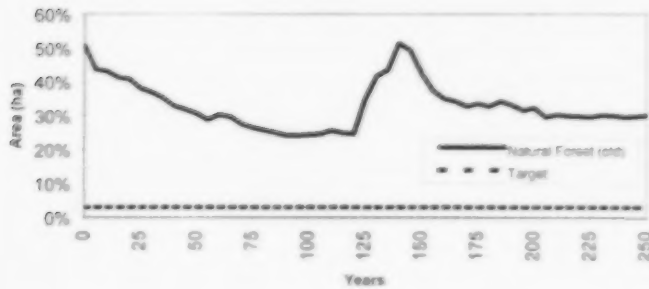
Old Seral Non-Pine D4 (SBSdw2), SFM Scenario



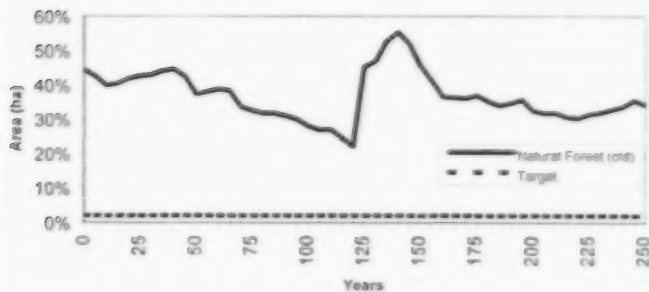
Old Seral Non-Pine D6(SBSdw3), SFM Scenario



Old Seral Non-Pine D6 (SBSmc2, MSxv), SFM Scenario

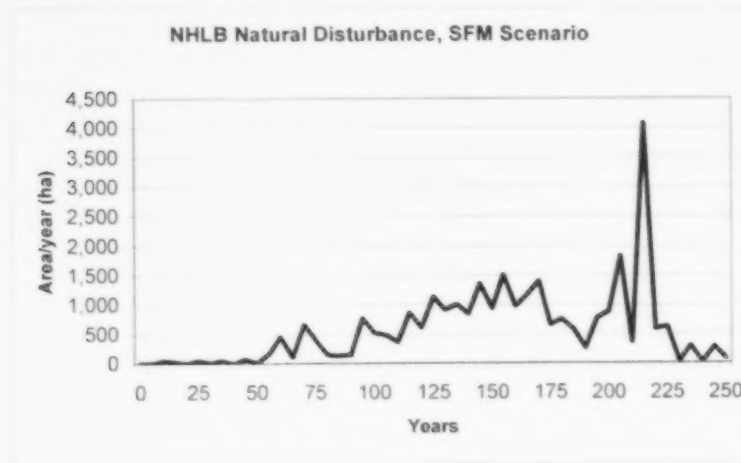


Old Seral Non-Pine D7 (SBSmc3), SFM Scenario



Some of the above charts in the previous Figure 6 show that on occasion, the late seral target is not met. This is caused by the assumption that in the NHLB the forest will go through natural disturbance when it reaches 280 years of age (refer to Figure 8).

Figure 8. The Forecasted Natural Disturbance within the Non-timber Harvesting Land Base in the Vanderhoof Defined Forest Area



As can be seen in Figure 8 the area of natural disturbance remains close to or over 500 ha per year from year 95 on with some small exceptions. Between years 215 and 220 over 4,000 ha of NHLB goes through natural disturbance annually (total of 20,000 ha).

The difficulty in meeting the old growth target due to the assumptions regarding natural disturbance were experienced roughly at the mid point of the planning horizon (between years 100 and 150, NDU 1) and at the end of the planning horizon (NDU 3, 4, 5 and 7). Some may argue that not meeting the late seral targets because of natural disturbance assumptions indicates that the long-term management direction is not sustainable. However, current assumptions regarding natural disturbance are arbitrary and may change once more information becomes available on natural stand dynamics. As an example, this analysis assumed that all late seral stands in the NHLB become young stands after natural disturbance. This is not a likely a correct assumption. Also, the age of 280 was used as an over-all natural disturbance age. This may or may not be a correct assumption. Further, using optimization or research algorithm based timber supply models would avoid this problem by looking at the whole planning horizon simultaneously and scheduling harvest so that no violations of late seral or other targets would happen. These kinds of models "can see" upcoming natural disturbances before they happen. The downfall with this approach is that one is not supposed to be able to predict when and where natural disturbance happens.

Future forecasting of this measure will occur during the timber supply analysis, which occurs in five-year intervals. Results of any forecasting initiatives may be presented to the PAG as part of the annual report for the SFMP.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Licensee Team members that are part of the LOWG will assist assessment of the status of this measure on an on-going basis and look for opportunities for continual improvement.

Substantial loss of old seral is expected due to mortality from the mountain pine beetle infestation and resulting salvage activities. Therefore, the LOWG has developed a surrogate for old growth, which will include a portion of dead pine stands that contain as many old growth attributes as possible. These surrogate stands are classified as Natural Forest Areas (NFA). The Licensee Team has identified the use and value of NFAs as a surrogate to old growth as a possible opportunity for continual improvement.

4.8 Patch Size

Statement of Measure	Management Objective
1-2.7 The percent area by patch size class by NDU.	Achieve and sustain patch size targets by NDU (see Table 11).

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity
• Element 1.1 – Ecosystem Diversity
Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity
• Element 2.2 – Ecosystem Productivity

What is this measure?

A patch is defined in this SFMP as a particular unit with identifiable boundaries and different vegetation from its surroundings (see glossary in Appendix II). Patches often consist of even aged forests because most are the result of either a natural disturbance such as fire, wind or pest outbreaks, or from harvesting timber in a cutblock. Patches may be created through single disturbance events or through a series of events (i.e. a combination of natural disturbance and harvesting). Mature forests and younger forest patches represent a land base created from a history of disturbances, natural and otherwise. As such, forest stands and patches are often composed of a variety of species, stocking levels and ages. Currently, forest management practices have reduced the occurrence of many natural disturbance events, such as wildfire. In the absence of natural disturbance, timber harvesting is employed as a disturbance mechanism and thus influences the distribution and size ranges of forest patches in the same fashion as historical natural disturbance events.

Patch Size Categories:

- < 51 hectares
- 51-100 hectares
- 101-1000 hectares
- > 1000 hectares

Harvesting activities serve to mimic natural disturbance events characteristic within the Vanderhoof DFA. Past social constraints associated with harvesting and resulting patch size have lead to fragmentation of the landscape beyond the natural ranges of variability, which has developed over centuries from larger scale natural disturbance. In order to remain within the

natural range of variability of the landscape and move toward sustainable management of the forest resource, it is important to develop and maintain patch size targets based on historical natural patterns. This measure will monitor the consistency of harvesting patterns compared to the natural patterns of the landscape.

Current practices and state of measure

The Landscape Objective Working Group (LOWG), which has representation from MSRM, MOF and timber licensees is currently developing landscape biodiversity objectives for patch size class by NDU for the Prince George Forest Region, which includes the Vanderhoof DFA. The Vanderhoof DFA is composed of the Most Interior NDU, which is further classified into Mountain and Plateau. Through research conducted by Craig DeLong (2002) on NDU attributes, patch size categories have been defined. As identified in Table 11, certain patch size categories have either been achieved or are coming close to the target values identified by the LOWG. Forecasting activities will help to identify the future condition of forest stands, overall patch size influence and the future status of this measure based on the identified assumptions.

Table 11. Patch Size Classes by NDU in the Vanderhoof DFA

Natural Disturbance Unit	Patch Size Category	Current Status March 31, 2004*	Target (%)	Variance (%)	Forecasting Results (ranging over 260 years)
D1 Moist Interior Mountain	>1000 ha	35.4%**	40%	+/- 5%	0% - 66.0%
	101-1000 ha	28.2%**	30%	+/- 5%	23.1% - 55.7%
	51-100 ha	24.9%	10%	+/- 2.5%	4.0% - 26.9%
	≤ 50 ha	11.6%	20%	+/- 2.5%	6.1% - 31.8%
D2 Moist Interior Plateau	>1000 ha	57.1%	70%	+/- 10%	18.7% - 83.1%
	101-1000 ha	21.3%**	20%	+/- 5%	10.2% - 45.5%
	51-100 ha	12.8%	5%	+/- 2.5%	1.9% - 15.3%
	≤ 50 ha	8.7%	5%	+/- 2.5%	4.7% - 23.1%

*The current status is from the LOWG Analysis Project (2004)

**Current Status meeting target

How are targets established?

Targets come directly from the LOWG Analysis Project (2004) and are based on the NDU science developed by Craig DeLong (2002). Certain factors will limit how effective Licensee Team members will be at trending toward patch size targets. These include historical harvesting patterns that have fragmented portions of the DFA and natural disturbance events such as the mountain pine beetle epidemic and occurrences of wildfire. The four patch size categories will be applied to each unit, yielding a total of 8 targets that will be applied to this measure.

How will this measure be implemented, monitored and reported?

Each member of the Licensee Team is currently proposing harvesting opportunities that will move the current status of each patch size category that will trend the current status closer to the targets.

Data used to calculate and monitor this measure includes:

- Forest cover inventory information, plus updates from Licensee Team members. Forest cover information is updated every 5 years in preparation for timber supply analysis. However, short-term updates for reporting purposes may be completed by the LOWG Implementation Team.
- Harvesting information from each Licensee Team member's respective database will be collated annually to produce a DFA digital layer identifying patch size trends.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, there were patch size categories defined within the Defined Forest Area. However, through the natural disturbance research conducted by Craig DeLong (2002) these categories were refined to correlate with Natural Disturbance Units across British Columbia.

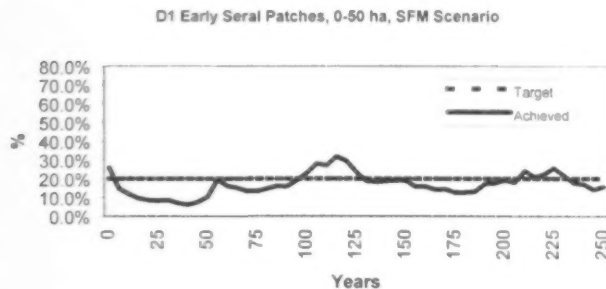
b) Implementation of SFMP: Patch size targets based on natural disturbance types will be monitored through the Landscape Objective Working Group (LOWG). Forest cover inventory information with updates from Licensees based on harvesting activities will be analysed on an annual basis to ensure forest management is moving toward patch size targets identified through the LOWG and this SFMP.

Forecasting and probable trends of measure

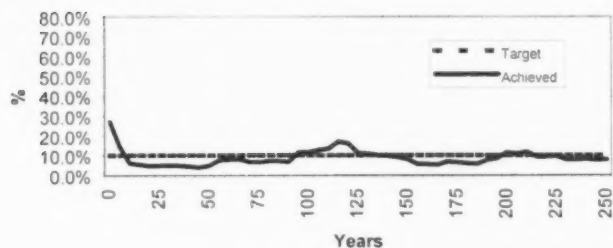
Early seral patch sizes were predicted using a spatially explicit timber supply model. The model was used to report on the patch size distributions achieved using a harvest schedule from the SFM Scenario. There was no attempt use a spatial model to create specific patch distributions.

The following charts in Figure 9 show predicted early seral patch distributions over time. All the reports are based on a 50m adjacency distance, i.e., individual polygons were considered to belong to the same patch if they met the requirement of less than 40 years of age and within 50 meters from each other.

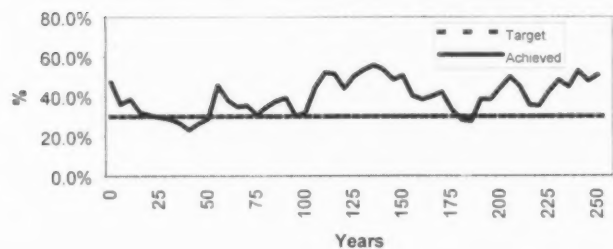
Figure 9. Patch Size Forecast within the Vanderhoof Defined Forest Area



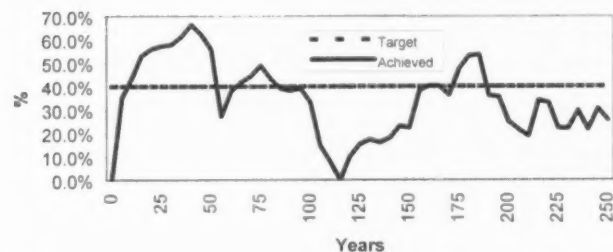
D1 Early Seral Patches, 50-100 ha, SFM Scenario



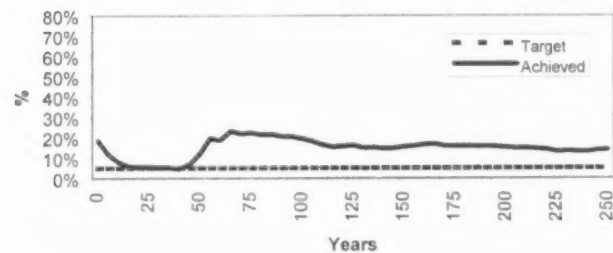
D1 Early Seral Patches, 100-1000 ha, SFM Scenario

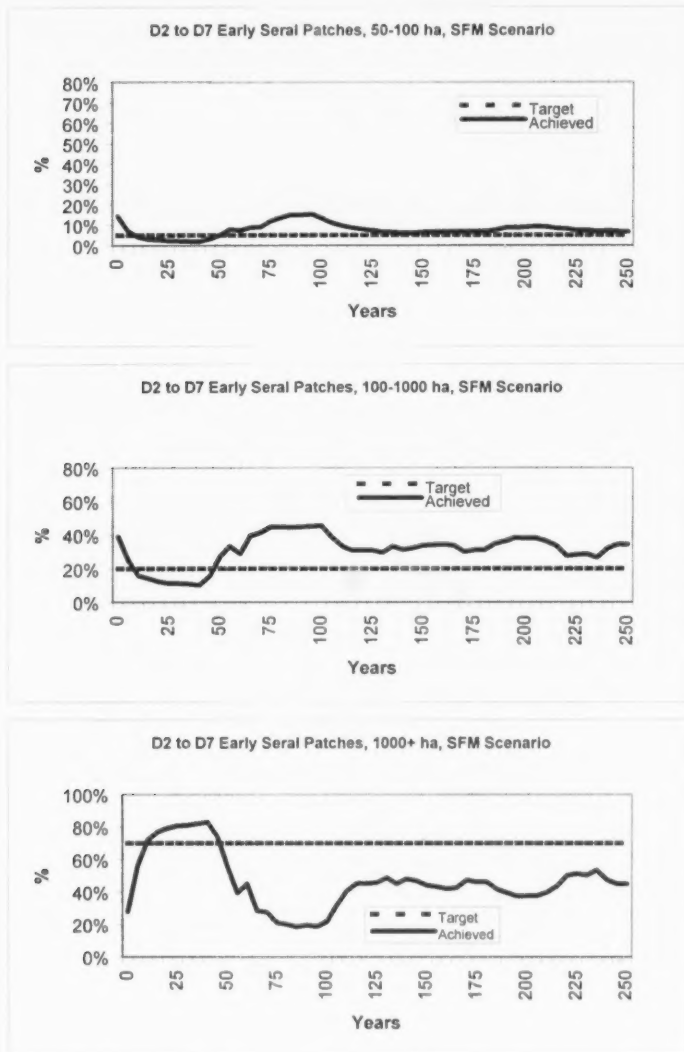


D1 Early Seral Patches, 1000+ ha, SFM Scenario



D2 to D7 Early Seral Patches, 0-50 ha, SFM Scenario





The charts in Figure 9 illustrate that while the patch targets were not generally met, the overall trends are reasonable. As mentioned earlier, the patch results are summarized based on the predicted timber supply over 250 years with no attempt to create a harvest schedule that would meet the patch targets. It is believed that operationally, the targets are achievable and trending can be monitored annually.

Generally, the larger patches are more difficult to achieve, particularly during those times when harvest is limited due to the availability of timber. No harvest or little harvest within a NDU/mBEC unit for consecutive years creates less early seral forest, which makes it more difficult to have 70% of the patches in that NDU over 1,000 ha in size.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team has identified the beetle related mortality and resulting change in seral stage, and therefore patch sizes as an future knowledge gap. The Implications of this mortality and the results to patch size is not fully understood. To continue to improve this measure the Licensee Team will work with the LOWG to develop understanding and potential strategies.

4.9 Plant Diversity Index

Statement of Measure	Management Objective
1-2.8, 1-5.2 The Plant Diversity Index for site association groups above the baseline target on the THLB.	Sustain the Plant Diversity Index consistent with the values identified in Table 12.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat elements and structure important to maintain biological richness are sustained.
- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Genetic diversity of plant species within the Defined Forest Area (DFA) is sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity • Element 1.2 – Species Diversity • Element 1.3 – Genetic Diversity Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity • Element 2.1 – Forest Ecosystem Resilience
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What is this measure?

Forest operations, through harvesting and reforestation, have a dramatic influence over the composition of the mixture of plants (including trees) within managed stands. In order for entire ecosystems to function effectively and maintain their ability to recover from disturbances (e.g. forest harvesting activities), it is necessary to maintain the natural species and genetic diversity of communities. Plant species provide the basic requirements and fundamental habitat for fauna and contribute to the recycling of nutrients and other life sustaining elements necessary to maintain the productive capacity of the ecosystem.

A plant diversity index is defined in this SFMP as a mathematical measure of species diversity in a community (see glossary in Appendix II). Diversity of plant species in turn directly correlates to a diversity of genes within plant communities. Diversity indices provide more information

about a plant community's composition rather than determining plant species richness (e.g. the number of species present). They also take the relative abundance of different plant species into account. Plant diversity indices also provide important information about rarity or commonness of species in a community. The ability to quantify plant diversity through use of diversity indices is an important tool for forest managers when attempting to understand functionality of communities (Magurran 1988).

It is more valuable to use a combination of plant diversity indices to access overall plant diversity as each index is used to identify particular trends that a single index may not reveal. Two reports prepared by Timberline (2002, 2003) review commonly used plant diversity indices, including the Shannon-Wiener Index, Simpson's Index and Species Richness.

A comparison of each index reveals that the Shannon Wiener Index is more sensitive to uncommon plant species and more value is given to the presence of each species rather than the abundance of each species. Simpson's Index is sensitive to shifts in dominant plant species and equal value is given to the presence of each species, thereby allowing the abundance of each species to impact the index. Species Richness is simply a count of the number of plant species present, and when used in conjunction with other indices, it can reveal other trends in plant diversity, particularly during transitions between seral stages.

Ecologists generally believe that resilient ecosystems equal healthy ecosystems. Maintaining the natural levels of plant species and genetic diversity within the DFA will help to ensure that the land base is resilient and that an overall landscape diversity is conserved. Maintaining natural levels of plant diversity within managed stands will demonstrate that these areas are diverse and are therefore, resilient, productive and functioning ecosystems.

Current practices and state of measure

Currently, forest management practices within the DFA do not consider plant diversity. As such, data for this measure was taken from information collected for the entire Prince George TSA. The Vanderhoof Forest District is part of this TSA, which implies that the data can be used with confidence for the DFA until localized data is collected.

The current status was established from Northern Interior Vegetation Management Association (NIVMA) data and natural regeneration data that was initially compiled as part of a report prepared by Timberline (2002) for the Prince George TSA. This was later updated with current status information to 2003. The results are shown in Table 12. Further details as to plot selection and grouping of ecosystems can also be found in this report. Table 12 identifies the actual post harvest index from NIVMA data, baseline targets, and the index for natural stands.

The eight site association groups were derived from identifying unique site associations within the DFA. These site associations were then grouped into eight ecologically similar units, which were then termed "Grouped Site Associations". The site association groupings provide a stratum from which to decide the number of associations that could be reasonably assessed for plant diversity over time. Further information on the site association groups can be found in the Timberline report "Monitoring Plant Diversity for Certification Initiatives" (2002).

Table 12. Plant Diversity Index Summary for Vanderhoof DFA

Grouped Site Association	Plant Diversity Index	Current Status 2003	PGTSA Target*	Variance
Sxw - Huckleberry	Shannon-Wiener	3.30	>1.415	0%
	Simpson	0.06	<0.349	0%
	Richness	48.10	>27	0%
Sxw - Devils club	Shannon-Wiener	3.04	>2.029	0%
	Simpson	0.09	<0.185	0%
	Richness	45.40	>27	0%
Sxw - Oak fern	Shannon-Wiener	3.05	>2.041	0%
	Simpson	0.09	<0.219	0%
	Richness	44.81	>27	0%
SxwFd - dry	Shannon-Wiener	3.24	>2.062	0%
	Simpson	0.09	<0.200	0%
	Richness	53.00	>21	0%
PlSb - Feathermoss	Shannon-Wiener	3.01	>1.286	0%
	Simpson	0.11	<0.433	0%
	Richness	46.60	>17	0%
Sxw - Horsetail	Shannon-Wiener	2.75	>2.216	0%
	Simpson	0.15	<0.163	0%
	Richness	49.33	>50	0%
Bl - Oak fern	Shannon-Wiener	2.91	>1.968	0%
	Simpson	0.10	<0.262	0%
	Richness	37.20	>28	0%
Sxw - Twinberry	Shannon-Wiener	3.12	>2.212	0%
	Simpson	0.09	<0.175	0%
	Richness	53.75	>30	0%

*Target based on the report "Establishing ecological benchmarks for plant diversity in the PGTSA" (Timberline 2004a)

How are targets established?

Baseline targets were determined for each site association group present in the Prince George TSA by establishing natural regeneration plots within areas that have been affected by a natural disturbance and are of a similar age (see Timberline 2004a).

How will this measure be implemented, monitored and reported?

To date, the source of the data to support monitoring of this measure has been NIVMA permanent sample plots. NIVMA plots follow a very structured data gathering protocol and are randomly established across the Prince George TSA. Monitoring plots are permanent sample plots that are re-measured on a fixed schedule. New plots are added over time in accordance with available resources.

If NIVMA is discontinued in the future and in the interest of cost-efficiency, and to localize plant diversity information, the Licensee Team will, in the future, look at monitoring this measure by collecting the necessary vegetation data as part of their regular silviculture survey protocol. The methodology and recommendations contained in the Timberline report (2004b) may be implemented. Once a survey procedure is developed, a monitoring and reporting plan will also be developed and initiated.

Measure Calculation

Each of the following calculations is completed for each of the grouped site associations.

Shannon Wiener Index: Calculate the total of all individuals (or percent cover) and determine the proportion that each species contributes to the total (p_i). Multiply the proportion of species by the natural log of the proportion. The sum of all the species values is the Plant Diversity Index.

Simpson's Index: Calculate the total of all individuals (or percent cover) and determine the proportion that each species contributes to the total (p_i), and then square the proportion. The sum of all the individual species values is the Plant Diversity Index.

Species Richness: Count the number of species present. To monitor this measure, reports will be run each year and compared to the overall target. The measure data will be used by silviculture foresters to review long-term trends in reforestation and practices will be adjusted where necessary.

Shannon-Wiener Index $H = -\sum_{i=1}^S (p_i)(\ln p_i)$ where: H = index of plant diversity S = the number of species p_i = the proportion of the total sample belonging to the ith species $\ln$ = the natural log
Simpson's Index $SI = \sum_{i=1}^S p_i^2$ where: SI = the index of plant diversity S = the number of species p_i = the proportion of the total sample belonging to the ith species

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, plant diversity was present throughout the Defined Forest Area, but it was never formally assessed or monitored.

b) Implementation of SFMP: Plant diversity information is currently translated from Prince George TSA data. This information will be localized in the future through data collected during silviculture surveys. Plant diversity will be maintained at levels identified through research as ecological benchmarks that will allow diversity to be sustained in managed stands.

Forecasting and probable trends of measure

As stated previously in this section, a plant diversity index provides an indication of the overall health and resiliency of an ecosystem. This measure is not easy to quantifiably forecast over a defined time frame, but it is important to identify what the accepted target means to SFM. From a review of current literature, it is not entirely certain what effects would occur if plant diversity is not maintained within the natural range of variation. Several studies currently exist that investigate monitoring of plant diversity and establishing ecological benchmarks, but results from these studies depend on years of analysis and therefore will not be available for quite some time. Future trends for plant diversity will be forecasted in this SFMP based on a logical analysis of a "what if scenario". The "what if scenario" contains two potential scenarios for analysis in order to justify the chosen target:

- a) What if plant diversity is maintained above the natural range of variation?
- b) What if plant diversity falls below the natural range of variation?

The natural range of variation refers to a range of values for a specified attribute that exist in natural, undisturbed ecosystems. Maintaining elements in ecological systems within the natural range of variation helps to ensure that an ecosystem is not overly stressed by disturbance and has the ability to recover from that disturbance. Maintenance of plant diversity above the natural range of variation would likely not affect other elements in an ecosystem either positively or negatively. Natural systems operate at a certain level of efficiency and exceeding this natural range would presumably not generate a surplus of returns, as the ecosystem would eventually reach a maximum return level within its natural range.

On the other hand, maintaining plant diversity below the natural range of variation would likely have noticeable impacts on the disturbed ecosystem. As diversity of plants decreases it could potentially affect the quality of habitat for wildlife. Species tend to require certain attributes during their life cycle and if the diversity of an ecosystem is decreased, these attributes may not be available to the species that require them. This, in turn, could lead to a decrease in quality of life due to reduced wildlife populations within the DFA. Reduced plant diversity may also potentially affect nutrient cycling within a disturbed area. This may lead to poor quality regeneration of trees on the site and in the long-term, reduced economic value from the DFA.

As relatively little research currently exists regarding plant diversity in managed sites, targets for this measure were set based on existing NIVMA plot data within the DFA. This plot information is an indication of the natural state of plant diversity within the Vanderhoof area. By maintaining this natural range of variation, other important ecological, economic and social attributes will also exist and continue in a more sustainable manner. Therefore, the Licensee Team is committed to maintaining the plant diversity targets established through this SFMP.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual improvement for this measure will focus on obtaining more localized data for the DFA. The Licensee Team will review current data collection options in adjacent districts, and determine the most effective way to collect and maintain this data in the long term.

4.10 Average Stand Level Retention for Harvested Blocks

Statement of Measure	Management Objective
1-2.9 The average stand level percent retention for all harvested blocks by NDU.	Achieve and sustain >10% retention at the stand level (0% variance) by NDU (see Table 13).

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity
• Element 1.2 – Species Diversity
• Element 1.3 – Genetic Diversity
Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity
• Element 2.2 – Ecosystem Productivity
Criterion 3 – Conservation of Soil and Water Resources
• Element 3.2 – Water Quality and Quantity

What is this measure?

Stand level retention consists primarily of wildlife tree patches (WTPs), which are defined as forested areas of timber within or immediately adjacent to a harvested cutblock. Residual patches of timber are generally retained for their value in providing a source of habitat for wildlife, to sustain local genetic diversity, or to protect important landscape or habitat features, such as mineral licks and raptor nesting sites. Maintenance of habitat through WTPs contributes to conservation of species diversity by conserving a variety of important features such as shrubs, CWD, and live or dead standing timber for cavity sites. Elements retained in WTPs may also help to conserve critical habitat components that support residual populations, they help with the re-introduction of populations expatriated by disturbance, and they help with overall ecosystem function (Bunnell et al. 1999).

Retaining WTPs that represent natural forest stands within the prescribed area will contribute to the maintenance of the natural range of variability in ecosystem function, composition and structure. As such, properly planned stand level retention areas will help managed ecosystems recover from forestry-related disturbance and potential stress.

WTPs in managed stands also contribute to a landscape level pattern that attempts to emulate wildfire. During a fire disturbance, large areas may be burned and undamaged or lightly burned patches may exist in areas within the burn boundary. Residual patches left by wildfire vary substantially in size, shape and composition. Therefore variability in these characteristics within designed WTPs is also essential.

Current practices and state of measure

Table 13 summarizes the current status of WTP retention levels within the DFA as of March 31st, 2004. Areas included in the table were derived from blocks where harvesting activities commenced prior to March 31st, 2003, under approved Forest Development Plans.

The current, average, stand level percent retention for all harvested blocks during the stated time frame is 12%. Although this table displays the current status by NDU/mBEC unit, the overall measure requires an average value per NDU. Within the Vanderhoof DFA, there is one NDU.

Table 13. Stand Level Retention within the DFA and Associated Targets

Natural Disturbance Unit	Merged Biogeoclimatic Units	Current Status March 31, 2004* (%)	Target	Variance
D1 Moist Interior Mountain	ESSF mv1, ESSF mvp1, ESSF xv1	13	N/A	N/A
D2 Moist Interior Plateau	SPBS mc	100	N/A	N/A
D3 Moist Interior Plateau	SBS dk	12	N/A	N/A
D4 Moist Interior Plateau	SBS dw2	7	N/A	N/A
D5 Moist Interior Plateau	SBS dw3	12	N/A	N/A
D6 Moist Interior Plateau	SBS mc2, MS xv	8	N/A	N/A
D7 Moist Interior Plateau	SBS mc3	13	N/A	N/A
Average		12%	>10%	0

How are targets established?

A baseline target of at least 10% stand level retention by NDU was established for this measure in order to comply with Part 4, Division 5, Section 66 (1) (b) of the Forest Planning and Practice Regulation of FRPA. It should be noted that this target may change as legislation evolves. This measure is designed to monitor the overall percentage of stand level retention based on NDU. However, as noted in the table above, the Licensee Team will provide the PAG with stand level retention by NDU and merged BEC (mBEC) units. It is important to note that each individual cutblock may contain more or less than 10%, but the overall average will achieve >10% by NDU.

How will this measure be implemented, monitored and reported?

Potential sources for calculating and monitoring this measure include Site Plans, EMS pre-work forms, EMS harvest inspection forms, and various licensee information tracking systems such as Genus rmt or Informs. Stand level retention that is indicated in the Site Plan will be recorded for harvested blocks and then averaged by NDU. Annually, these values will be updated as future blocks are harvested, and then reviewed to ensure targets are being achieved. Results will be reported to the Licensee Team and the PAG as part of the SFMP annual report.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, stand level retention was prescribed throughout the Defined Forest Area, but it was never formally monitored after harvest.

b) Implementation of SFMP: Stand level retention will be monitored through Site plans prior to harvest and through harvest inspections once logging activities are complete. All information will be entered into Genus rmt in order to track stand level retention across the Defined Forest Area and to ensure targets are being met.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame, however it is important to identify what the accepted target means to SFM. Retention at the stand level contributes to biodiversity of ecosystems through vertical structure on the land base, wildlife habitat for a variety of species, emulation of natural disturbance patterns, and promotion of genetic diversity based on retention trees acting as a natural seed source. Currently, forecasting of this measure will be completed with the use of a "what if scenario" to help identify anticipated future trends for stand level retention. When forecasting an attribute in this manner, it is useful to identify two potential scenarios:

- a) What if no stand level retention was prescribed in managed stands?
- b) What if three times the stand level retention was prescribed in managed stands?

This measure is similar to the retention of individual live and/or dead trees in forest stands. The overall perceived value from stand level retention is assumed to increase with the number of retention areas present in managed stands. This continues up to a saturation point where overall value then begins to level off and positive returns are no longer realized. While it is currently not possible to identify this point of equilibrium on the basis of existing information, assumptions surrounding the above mentioned "what if scenarios" can be made. If no stand level retention was prescribed in managed stands, it is anticipated that biodiversity values would decrease, wildlife productivity may decline, natural species diversity would decrease and natural patterns across the landscape would not be represented. If three times the stand level retention was prescribed in managed stands economic values from the timber resource would not be fully achieved and reforestation or other silviculture activities would potentially become more costly and less efficient due to smaller patches of harvested timber. Higher levels of retention would also affect natural disturbance patterns for patch size across the DFA with higher levels of smaller patches and increased fragmentation of the landscape.

In the long-term, failing to achieve the identified target for this measure could reduce the ecological values of forest stands, and could also negatively impact economic and social values across the DFA. The above "what if scenario" analysis implies that a balance of values can be achieved through maintenance of an identified level of stand retention that lies somewhere in between the two scenarios. Although this level has not yet been identified through past experience or through scientific findings, the Licensee Team is committed to achieving the identified target and will strive to continually improve practices, as new information becomes available. Within the Vanderhoof DFA, future trends will likely show that stand level retention percentages across the land base will remain constant or potentially decrease. Whether through landscape level plans such as the Landscape Objective Working Group (LOWG) or through management by forest licensees, stand level retention will continue to be a part of forest management within the DFA.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. A potential opportunity for continual improvement would rely on developing strategies to assess the effectiveness associated with wildlife and biodiversity objectives through stand level retention.

4.11 Develop Management Strategies for Riparian Sensitive Species

Statement of Measure	Management Objective
1-2.10 Develop "management strategies" for riparian sensitive species (i.e. beaver) to achieve early seral deciduous conditions.	Management strategies will be developed by December 31, 2005 (+3 month variance).

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 1 – Conservation of Biological Diversity</p> <ul style="list-style-type: none"> • Element 1.1 – Ecosystem Diversity • Element 1.2 – Species Diversity <p>Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <ul style="list-style-type: none"> • Element 2.2 – Ecosystem Productivity |
|---|

What is this measure?

Forest management, through the harvest of stands, affects the temporal and spatial distribution of seral stages. Current regulations and management practices within the DFA lean towards retention of late seral or old coniferous forest adjacent to wetlands and riparian areas. This practice suggests a potential over representation of late seral forest types adjacent to riparian areas, which could potentially diminish riparian habitat and abundance of riparian sensitive species.

One example of how an over abundance of late seral forest types directly adjacent to riparian areas may affect riparian sensitive species can be explained through a review of the requirements of beavers (*Castor canadensis*). Beavers require young, deciduous trees for both a food source and as a material to build their shelters, known as dams or lodges (Whitaker, Jr. 1980). The beaver is one important riparian sensitive species and the development of a management strategy will help to address riparian habitat features that are critical for a broad cross section of riparian sensitive species.



Current practices and state of measure

Management strategies for riparian sensitive species do not currently exist within the DFA. Members of the Licensee Team are committed to developing a priority schedule for production and implementation of management strategies for species considered as sensitive.

How are targets established?

The target for this measure was based on workloads for Licensee Team members. Based on what is potentially required for strategy development and the availability of existing data, the timeline to develop the strategy is December 31, 2005.

How will this measure be implemented, monitored and reported?

Licensee Team members will present a draft management strategy(s) to the PAG for review. A final draft strategy will be prepared with input from the PAG by the target date.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, management strategies for riparian sensitive species did not exist.

b) Implementation of SFMP: Management strategies for riparian sensitive species will be developed and implemented through Site Plans where applicable. After strategies are developed, the SFMP may be updated to incorporate monitoring plans for riparian sensitive species and the efficacy of management strategies.

Forecasting and probable trends of measure

This measure differs from the majority of other measures in that it is targeted at developing a new management strategy for the Vanderhoof DFA. Therefore, the method used to forecast this measure will also differ from the typical "what if scenario" utilized for other measures. An analysis of the "what if scenario" will identify why the stated target was chosen for this measure and how it contributes to SFM in the Vanderhoof DFA.

As with previous "what if scenarios", it is useful to identify two potential scenarios:

- a) What if management strategies for riparian sensitive species were developed considerably earlier than December 31, 2005?
- b) What if management strategies for riparian sensitive species were developed considerably later than December 31, 2005?

The first scenario suggests that management strategies for riparian sensitive species would be developed much earlier than December 31, 2005. The most important point to make regarding this scenario is that it is realistically not achievable. As these strategies have previously not been developed or implemented within the DFA, considerable research and development is required in order to produce baseline data for a preliminary management strategy. In order to develop a meaningful and useful strategy, scientific and occupational expertise will be an important part of strategy development and a certain timeframe is required in order to produce a valuable end product.

In contrast, the second scenario suggests an extension of the existing target to later than December 31, 2005. While this would ensure the inclusion of relevant scientific data and expertise, the timeline is not conducive to implementation of this SFMP and movement toward sustainability of the forest resource values identified by the PAG. While it is important to allow adequate time to develop useful strategies, it is also important to actively pursue these strategies in order to move forward with the SFM initiative.

As previously mentioned, PAG members initiated this measure through a concern that current forest management practices focussed on retention of older seral forest and that younger seral types may not be available in the future for riparian species that depend on these younger stand types. Development of a management strategy for identified riparian sensitive species will ensure that future forest practices do not exclude ecosystem and land base attributes that are vital to these habitats. The Licensee Team is committed to developing riparian sensitive species management strategies in order to conserve the riparian values that have been otherwise overlooked in the past due to retention of older seral forest types. Within the Vanderhoof DFA, future trends will likely show that these management strategies have been implemented where applicable and that a more diverse range of riparian attributes are being retained where sensitive species exist. Once management strategies are developed and implemented, baseline data for riparian sensitive species will start to become available and future targets and trends will be easier to identify.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. This measure as a whole is an example of continual improvement in the Vanderhoof DFA. Once this measure is complete, the Licensee Team will work with government to move forward with the implementation and future monitoring of these strategies. The Licensee Team has identified an opportunity for continual improvement through the assessment of the balance of conserving habitat for an abundance of riparian sensitive species versus single species management.

4.12 Stream Crossing Density by Watershed

Statement of Measure	Management Objective
1-2.11, 1-4.2 Stream crossings density by watershed.	Achieve and sustain ≤ 0.266 (+10% variance) stream crossings per kilometer of road by watershed in the DFA. Report annually.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.
- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Water resources are sustained by maintaining quality and quantity.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 3 – Conservation of Soil and Water Resources

- Element 3.2 – Water Quality and Quantity

What is this measure?

As the number of stream crossings are increased, so increases the risk of a reduction in water quality. Emphasis should be placed on limiting the number of stream crossings within the DFA and on improving the state of existing crossings in order to lessen the effects on water quality over time. This measure was designed to monitor the number of stream crossings in the DFA broken down by watershed (see Figure 10). The conservation of water and soil resources is a vital part of the framework for SFM because water quality and conservation of aquatic habitats is fundamental to sustaining biological richness.

Current practices and state of measure

Stream crossing densities within the DFA have not been previously tracked. The current status of this measure will be determined through a query of GIS information for all roads and stream crossings within the DFA, where stream crossing information is available. The most current data to date is from the IFPA roads and landings inventory conducted within the Vanderhoof Forest District in 2003 and stream line work from the TRIM II database. All roads (in block and operational) and streams with a designation of S6 or greater (see glossary in Appendix II under Stream Class) were used in the analysis. The current practice of Licensee Team is to minimize the number of total stream crossings within the DFA.

Table 14 summarizes the stream crossings within the DFA by watershed. Within each watershed, the area of the watershed is recorded along with the total length of road, the total number of stream crossings and a calculated crossing density by watershed. The area of the watershed is not used in the density calculation, but is displayed in order to give scale to the stream crossing density value.

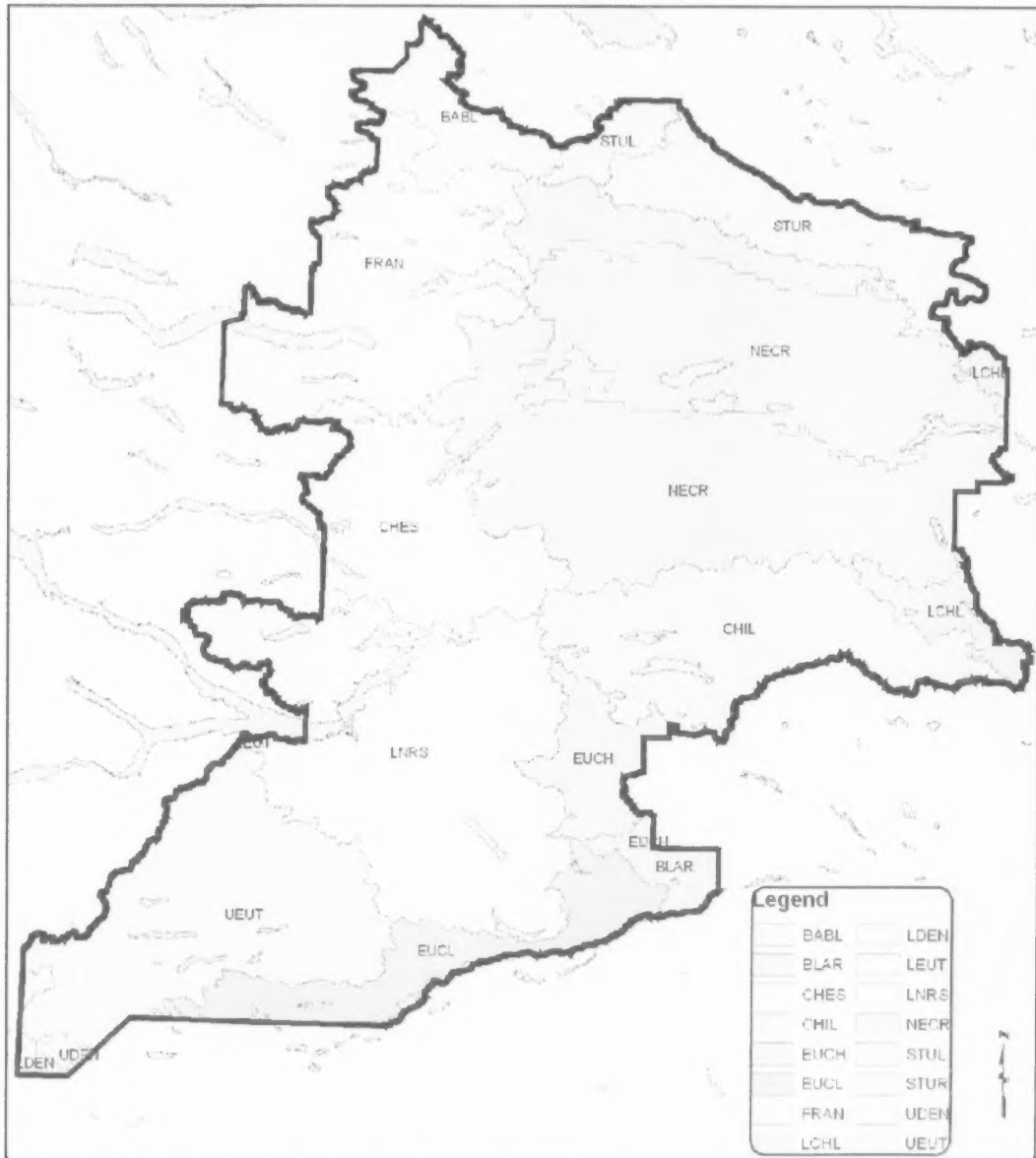
Table 14. Total Stream Crossings within the DFA by Watershed

Watershed	Area within the DFA (ha)	Road Length (km)	Total Stream Crossings	Stream Crossing Density (crossings per km)
NECR – Nechako River	416,756	3,318	779	0.235
STUR – Stuart River	66,784	899	257	0.286
STUL – Stuart Lake	14,394	298	84	0.282
BABL – Babine Lake	34,544	249	63	0.253
FRAN – Francois Lake	141,011	1,402	358	0.255
CHES – Cheslatta River	92,731	836	265	0.317
LNRS – Lower Nechako Reservoir	215,840	1,748	632	0.362
UEUT – Upper Eutsuk Lake	148,352	734	263	0.358
EUCL – Euginiko Lake	61,082	407	111	0.273
BLAR – Blackwater River	14,472	132	14	0.106
EUCH – Euginiko River	33,290	417	102	0.245
CHIL – Chilako River	120,487	1,190	224	0.188
LCHL – Lower Chilako River	24,892	384	42	0.109
LDEN – Lower Dean River	5,176	13	8	0.615
LEUT – Lower Eutsuk Lake	982	0	0	0.000
UDEN – Upper Dean River	878	0	0	0.000
TOTAL	1,391,671	12,027	3,202	0.266

How are targets established?

The target was established from a review of past practices. Currently, the total, average stream crossing density within the Vanderhoof DFA is 0.266. Current practice of minimizing stream crossings will continue in the DFA, therefore this base line data is used as the target value for this measure.

Figure 10. Watershed Groups within the Vanderhoof Defined Forest Area



How will this measure be implemented, monitored and reported?

The average number of stream crossings per kilometer of road in each watershed will continue to be monitored through the updating of the stream crossing inventory database as tied to the IFPA roads and landings project. This database will be updated as road construction and deactivation continues throughout the DFA, thereby removing and adding stream crossings over time. This data will be tracked in a joint database and reported out every two years to ensure targets are being achieved.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, stream crossing density was not formally reported or monitored.

b) Implementation of SFMP: Stream crossing density was determined across the Defined Forest Area as it has a direct correlation to water quality attributes. As harvesting and road building activities occur, the average number of stream crossings per kilometer of road in each watershed will be tracked through updates of the stream crossing inventory database developed through the IFPA roads and landings project.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is dependent on various, forest management related activities. The number of stream crossings in each watershed will be dependent on the levels of harvesting in the DFA, the number of roads built, the location of new roads and the number of crossings that are deactivated each year. However, it is important to identify what the accepted target means to SFM. Construction and maintenance of stream crossings potentially affect the water system for which the structure is being used to cross, and the use of a "what if scenario" is beneficial in identifying anticipated future trends. As the target for this measure is a value less than or equal to 0.266, one other scenario should be analysed:

a) What if the density of stream crossings was significantly greater than 0.266?

If the stream crossing density was significantly greater than 0.266, access levels for both the public and the forest industry would increase throughout the forest and the values of other interest groups could potentially be compromised. Another important potential impact of an increase in the number of stream crossings in the DFA could be an increase in the levels of sedimentation into streams and other water bodies, thereby negatively impacting water quality and potential habitat for water dwelling species, such as sport fish. This could eventually lead to a decrease in tourism due to a reduced fishery and other negative impacts to social values, including a reduction in the quality of the water supply in and around the community of Vanderhoof.

The target for this measure was set to try and reach a balance between access benefits and potential water quality impacts across the DFA. Therefore, the Licensee Team is committed to achieve the target of ≤ 0.266 stream crossings per kilometer of road within the DFA. Future trends will likely show that the number of road crossings within the DFA will remain constant. However, salvage efforts associated with the mountain pine beetle infestation may put this measure at risk of achievement and it is unclear at this point what the long-term trend for stream crossings will be. At this point, a substantial amount of road currently exists within the DFA due to high harvest levels resulting from the mountain pine beetle epidemic.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. With the increased harvesting related to the mountain pine beetle, the Licensee Team feels it is important to develop a methodology to consistently update the roads and landing database as a form of continual improvement. The Licensee Team will continue to explore a suite of measures that may better reflect all aspects of water quality, including quantity, quality and timing. Quantity and timing are currently largely dependent on the mountain pine beetle related stand mortality, therefore future aspects of this measure may change as the infestation subsides.

4.13 Quality of Stream Crossings

Statement of Measure	Management Objective
1-2.12, 1-4.3 The percentage of stream crossings planned and installed to design/standard.	Annually, 100% of planned stream crossings will be installed as per design or prescribed standard (-10% variance).
1-2.13, 1-4.4 The percentage of stream crossing inspections and resultant mitigation measures completed according to schedule.	Annually, 100% of mitigation measures (-10% variance) resulting from stream crossing inspections will be completed according to schedule.

These measures address the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.
- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Water resources are sustained by maintaining quality and quantity.

These measures also address the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| <p>Criterion 3 – Conservation of Soil and Water Resources</p> <ul style="list-style-type: none"> • Element 3.2 – Water Quality and Quantity |
|--|

What are these measures?

The conservation of water and soil resources are important objectives as related to SFM. Forestry roads can have a large impact on water quality and quantity when they intersect with streams, including potentially increasing sedimentation into water channels. Certain studies indicate that sediment yields from logging roads can show a 2 to 50 fold increase over historical sediment levels (Reid 1993) and these deposits can affect fish, fish habitat or other important aspects related to water usage (Slaney, Halsey and Smith 1977). Sediment is also a natural part of streams and lakes as water must pass over soil in order to enter a water body. When proper stream crossings are installed, over time the added levels of sedimentation may be minimized to help sustain the natural range of variation. From a forest management perspective, it is important

to ensure that a process is in place to monitor the quality of stream crossings, to identify problems and to mitigate any issues as soon as possible.

The first measure involves a process to ensure stream crossings (S6 or greater) within the DFA are installed according to design or prescription standard. The second measure involves the tracking of identified issues including stream sedimentation as a result of roads and stream crossings. Both measures will be implemented and monitored so that issues such as sedimentation issues can be identified and mitigation measures can be initiated promptly. The overall process for both measures involves inspections during installation, again at the end of installation, and during the life of the crossing as part of routine maintenance inspections, which are completed at a predetermined frequency based on the overall risk of the road and the structure.

Current practices and state of measures

Fish streams and crossing structures are both currently identified during operational plan preparation. As part of each Licensee Team member's EMS/Standard Operating Procedures (SOP), pre-work forms are completed for all projects, including stream crossings. Stream crossing installations are planned for commencement when conditions are favorable (i.e. fish windows). During the installation process, appropriate erosion control devices are also installed.

Stream crossing structures are currently inspected according to schedules laid out within each Licensee Team member's EMS or SOP. Inspections are risk ranked to ensure that stream crossings with higher fish values and higher risks of sediment delivery are inspected more frequently than lower risk crossings. All inspection results and mitigation actions are also tracked through each Licensee Team member's EMS/SOP.

Current status of the percentage of stream crossings planned and installed to design/standard is 95%. The percentage of stream crossing inspections and resultant mitigation measures completed according to schedule is also currently 100%.

How are targets established?

Each measure was assigned a target of 100% based on an assessment of current and past management practices. Targets for each measure demonstrate the Licensee Team's commitment to sustaining biological richness.

How will these measures be implemented, monitored and reported?

Data sources that may be utilized to calculate and monitor this measure over time include EMS/SOP and stream crossing checklists. The percentage of stream crossings planned and installed to design standards, along with inspection results and proposed mitigation measures completed according to schedule will be tracked. A long-term maintenance inspection schedule for stream crossing will be developed and implemented and the results of the inspections will be monitored and reported annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, stream crossings were identified in Operational Plans and were then installed and inspected, but this information was not formally reported or monitored.

b) Implementation of SFMP: Stream crossings will continue to be identified during Forest Development Plan (Forest Stewardship Plan) and Site Plan preparation. Pre-works will continue to be held prior to installation of crossings to ensure plan strategies are clear. Inspections of crossings will occur after installation and on a frequency determined by overall risk rating once installation is complete. Inspection results will be tracked, monitored and reported annually to ensure targets are achieved.

Forecasting and probable trends of measures

These measures are not easy to quantifiably forecast over a defined time frame, as they are operational in nature. However, it is important to identify what the accepted targets mean to SFM. Each of these measures relates to stream crossing quality, which is an important attribute in the Vanderhoof DFA, because stream crossings can impact overall water quality in natural water bodies. A "what if scenario" analysis will identify the importance of the targets for these measures to SFM within the DFA. Scientific data exists to further investigate water quality impacts within the DFA from forestry roads, but this measure and the following "what if scenario" will identify two potential scenarios that will help to substantiate proposed targets:

- a) What if only 50% of stream crossings were installed according to design or prescribed standard?
- b) What if only 50% of mitigation measures as a result of stream crossing inspections were completed according to schedule?

If only 50% of stream crossings were installed according to design or prescribed standard, both water quality and safety could be compromised. Water crossings are designed to mitigate sedimentation impacts into water features. Installation of crossings that are not per design could mean that water quality values may be negatively impacted. Crossings are also designed to allow safe passage over water features. Crossings that are not installed correctly may not ensure safe passage and could pose a threat to both the public and to forest industry workers using the crossings.

In response to the second measure, if only 50% of prescribed mitigation measures were completed according to schedule, again both water quality and safety could potentially be compromised. Mitigation measures are generally prescribed for stream crossings when during the stream crossing inspection the crossing is found to not be functioning as per design or prescribed standard. Therefore, like the first measure, crossings that are not functioning as per design could potentially increase sedimentation into natural water bodies or could affect safe passage over the crossing.

It is anticipated that some of the stream crossings within the DFA will require restoration work over their life span in order to reduce the risk of sediment delivery into water channels and to uphold safety standards. The Licensee Team is committed to achieving the stated target for each measure and long term trends are anticipated to show that stream crossings are routinely inspected and that restoration work is completed as required and on schedule.

Measure performances and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Data tracking methods are currently not consistent among the Licensee Team members. Over time, the tracking of this measure will be standardized in order to provide consistency. Currently the impacts associated with stream crossings are not well documented.

The Licensee Team feels an area of continual improvement could relate to providing a quality crossing index rating for streams at high risk within the DFA. This will help to establish base line data associated with potential sediment delivery into streams.

4.14 Amount of Permanent Access within the DFA

Statement of Measure	Management Objective
1-2.14, 1-4.5, 2-2.2 The percentage of area within the THLB in permanent access.	Annually, sustain < 4.2% of area within the THLB in permanent access (+1 % variance).

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.
- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Water resources are sustained by maintaining quality and quantity.
- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** Amount of productive forest land and road in the Timber Harvesting Land Base.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 3 – Conservation of Soil and Water Resources • Element 3.2 – Water Quality and Quantity Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles • Element 4.2 – Forest Land Conversion

What is this measure?

As defined in this SFMP, permanent access structures (PAS) include roads, bridges, landings, gravel pits, or other similar structures that provide access for timber harvesting (refer to glossary in Appendix II). PAS are best indicated on operational and site level plans. PAS are significant because road construction removes land area from the productive, forested land base. Unless significant rehabilitation work is completed on PAS areas, they will no longer produce a viable and productive forest stand. Permanent Access Structures may also have a negative influence on water quality and quantity if road locations and crossings are not planned appropriately. Implementation of water control measures at crossings will minimize siltation and erosion into water channels. Proper road location and the practice of minimizing stream crossings when constructing PAS will ultimately reduce the overall risk to water resources in the working forest.

Along with providing access for forestry activities, PAS are used to provide access to Crown land for other tenure holders, industrial users and various members of the public. PAS may also be used to allow access for fire protection activities on Crown land. As such, this measure monitors the amount of area permanently removed from the THLB on an annual basis as a result of access development, in relation to the area harvested during the same period. Minimizing the amount of land that is converted to roads and other non-productive structures helps to protect the forest ecosystem as a whole.

Current practices and state of measure

An inventory of roads and landings titled "Roads, Trails and Landings Inventory Project within the Vanderhoof Forest District" (Timberline 2004d) was completed for the DFA in 2003/2004. This project defined roads, landings and trails as per TRIM II definitions as follows:

- Roads are defined as any bladed structure constructed to access, develop and manage forest resources or access non-timber resources (i.e. recreation sites). Minimum length 50m;
- landings are defined as any bladed structure developed for the deposition and processing of timber.

Measurement of road width depended on whether the fill slope was considered favorable or unfavorable for tree growth. If slopes were favorable, the width to the top of the cut from a point where the sidecast was consistently greater than 20cm deep was measured. Isolated patches of sidecast deeper than 20cm that were not a contiguous part of the road fill were ignored. If fill slopes were favorable for tree growth, the width of the road from the top of the cut to the outside edge of the running surface was measured. Uncompacted berm and fill slopes were not included. Total disturbance width was measured to include the entire road prism, including all ditches, berms, cuts and fills (berms and fill were included in measurements regardless of soil conditions but did not include woody debris with <30% soil material). Running surface width encompassed total width impacted by vehicle traffic (Timberline 2004d).

Landings were measured using a hip chain traverse. In measuring landings, those that still had debris piles present were avoided during surveys where possible. If a survey was conducted before routine debris disposal, measurement was to the outside of the debris pile. If the pile was burned on the landing, running surface of the road, or on unfavorable sidecast, the burned area was counted as part of the landing. If fill slopes of the landing were favorable for tree growth, measurement was along the top of the cut and fill where possible. If fill slopes of the landing were unfavorable for tree growth, measurement was along the top of the cut to the outside edge of the landing surface (including fill) where possible. On level ground, compacted running surface, berms of unfavorable soil and associated ditches were included in measurements.

Table 15. Areas of Roads, Trails and Landings in the Vanderhoof DFA

Stratum	Road Class	Total Road Area (ha)	Non-productive Road Area (ha)	Total Landing Area (ha)	Non-productive Landing Area (ha)	Total Non-productive (ha)
Inside Blocks						
Roadside	All	1987.31	1643.50	522.00	219.49	1862.39
Conventional	All	3875.20	3258.08	2670.40	1121.55	4379.67
Outside Blocks						
Conventional	All	7150.09	7150.09	1026.10	430.96	7581.05
TOTALS		13012.59	12051.67	4219.50	928.18	13823.11

The roads, trails and landings report determined that the current percent of area within the THLB in permanent access within the DFA is 4.17%. The value of 4.17% was determined by taking the current percent of out-side block roads in comparison to the productive forest area (0.71%), and adding it to the current percent of in-block structures (3.46%). Table 15 is taken from the Timberline report on roads and landings within the Vanderhoof Forest District (2004d) and provides the general summary of areas occupied by PAS within the Vanderhoof DFA.

How are targets established?

The current target of $\leq 4.2\%$ has been determined from current base line data as indicated in the IFFPA roads and landings project report. The Licensee Team expects that current PAS will be maintained and potentially decreased in the future and have used the current status as the target for this measure.

How will this measure be implemented, monitored and reported?

Data sources that may be used to calculate and monitor this measure include updating of the roads and landings inventory recently created for the DFA, by utilizing Licensee Team member's operational and site level plans. Continual monitoring of this measure will be completed through updates to the roads and landings inventory. Therefore, this inventory must be updated every two years to ensure that targets are being achieved.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, permanent access was loosely monitored. Prior to the roads, trails and landings inventory conducted by Timberline (2004d), permanent access features were largely over-estimated within the DFA.

b) Implementation of SFMP: The roads, trails and landings database developed through the roads, trails and landings report will be utilized and built upon to monitor and report out on permanent access within the DFA. Regular updates to this database will occur as harvesting activities develop throughout the DFA, in order to deliver a more accurate and complete picture of permanent access features. Permanent Access will continue to be planned and partially monitored through Forest Development Plans (Forest Stewardship Plans) and Site Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is operational in nature. However, it is important to identify what the accepted target means to SFM. The amount of area that exists as permanent access contributes to ecological, economic and social values throughout the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this target identifies a value equal to or less than 4.2%, one other scenario should be identified:

a) What if considerably more than 4.2% of the area within the THLB was in permanent access?

If considerably more than 4.2% of the area within the THLB was in permanent access, impacts to all three of the values of SFM could be expected. Since permanent access structures remove productive forest area from the THLB, this increase in roads would reduce the future available timber supply, thereby decreasing the economic return from the forest resource. While the public may have greater access to the DFA if the permanent access were considerably more than 4.2%

of the THLB, wildlife populations may potentially decrease from a subsequent potential increase in hunting activity. Water quality and quantity values may also decrease as a significant increase in the construction of more permanent access would likely mean more stream crossings, thereby increasing sedimentation levels and other impacts to water resources. Social values, in turn, may potentially be impacted by the reduction in the productive land base, the potential decrease in water quality and also from potential adverse affects to wildlife from increased recreation, hunting and fishing opportunities.

This "what if scenario" analysis implies that a balance of values can be achieved through sustaining a minimal level of permanent access within the DFA. Although this level has not yet been fully identified through past experience, the Licensee Team is committed to achieving the identified target established through an analysis of the best information available. The mountain pine beetle epidemic continues to influence many aspects of this measure. The smaller salvage patches of past practices resulted in a higher proportion of permanent access structures. It is anticipated in the future that larger blocks will be planned and less road will be required to complete harvesting activities.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Part of the Timberline study was to identify existing roads and landings that have been identified to have a high potential for successful rehabilitation back to productive forest, and therefore back into the THLB. The Licensee Team will review these recommendations and look at possible implementation in the future.

4.15 Conformance with the Access Management Plan

Statement of Measure	Management Objective
1-2.15, 5-1.3, 9-1.3 The percent conformance with the Access Management Plan.	Annually, achieve 100% (-10% variance) conformance with the Access Management Plan.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.
- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber forest resources does not decline over time.
- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain opportunities for outdoor recreation activities.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles

- Element 4.2 – Forest Land Conversion

Criterion 5 – Multiple Benefits to Society

- Element 5.1 – Timber and Non-timber Benefits

What is this measure?

The Vanderhoof Access Management Plan is considered District Policy and was originally developed through the Vanderhoof LRMP process (1997). The LRMP developed the general guidelines for the creation of the Access Management Plan. These guidelines include the following:

- A wide range of access types are required
- The process should include public review and comment
- The plan should incorporate physical closures with posted signs
- Access management should be used when other strategies will not meet resource management objectives

The Ministry of Forests used these guidelines to develop the Vanderhoof Access Management Plan and to identify areas within the plan where additional access management is endorsed. The Access Management Plan is a living document that changes over time from continual input from the public, resource users and government agents received through annual reviews. Changes to the plan reflect changes in ecological, economic and social values experienced throughout the DFA. The Ministry of Forests is the steward of this plan and is responsible for ensuring an annual review and updates take place as required. The District Manager currently assumes the responsibility for adherence to the plan.

A wide variety of access types and features are required in order to provide a balance between ecological, economic and social values. This balance is delivered through the SFMP via the current Access Management Plan. This measure involves a commitment from the Licensee Team to operate in conformance with the Access Management Plan in order to meet SFM objectives.

Current practices and state of measure

Licensee Team members currently operate under the direction of the Vanderhoof Access Management Plan. Commitments to follow the current plan are stated in each of the operational plans (FDPs, and eventually FSPs) developed by the individual Licensee Team members.

Existing Licensee Team baseline data shows conformance with the Access Management Plan is currently at 89%.

How are targets established?

The target for this measure was set at 100% because all Licensee Team members have committed to following the direction provided through the Access Management Plan when conducting operational activities.

How will this measure be implemented, monitored and reported?

Data required to calculate and monitor this measure includes the total number of operations within access management areas compared to the number of operations within access management areas that are in compliance with the Access Management Plan.

Conformance with the Access Management Plan is currently monitored through each Licensee Team member's EMS or other commitment tracking systems. Access management proposals must be submitted to the Ministry of Forests for authorization prior to commencement of activities. Future reporting of this measure will be completed on an annual basis through the reporting function of the Licensee's tracking system.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, conformance with the access management plan was standard practice, however it was not formally monitored.

b) Implementation of SFMP: The Licensee Team has committed to 100% conformance with the most recent access management plan. While this is not a change from previous practice, through implementation of the SFMP conformance with the access management plan will be systematically monitored by Licensee Team members in order to report out on this measure annually. Commitments to follow the current access management plan will be identified in Forest Development Plans (Forest Stewardship Plans) and conformance with the access management plan will be monitored through each Licensee Team member's incident tracking system.

Forecasting and probable trends of measure

This measure cannot be quantifiably modeled, as it is simply a matter of conformance with an existing plan. However, a "what if scenario" can be used to illustrate the value of the chosen target in relationship to SFM. As this measure identifies the target at 100%, only one scenario applies for the "what if scenario" analysis:

a) What if the Licensee Team achieves only 50% compliance with the Access Management Plan?

Many variables relate to the commitment made by Licensee Team members to follow the Vanderhoof Access Management Plan, which is a living document that will continually change over time. As stated previously, the Access Management Plan is a public document that incorporates public input into the planning process. If Licensee Team members were to achieve only 50% conformance with this plan, the views of the public would not be properly incorporated into forest management planning within the DFA. Operating at only 50% conformance would also mean that Licensee Team members were not following District Policy.

Operationally speaking, achieving only 50% conformance with the Access Management Plan could potentially negatively influence other values within the DFA. Access management is implemented in order to control public and industrial access to help conserve other forest resource values, including wildlife habitat, guiding and trapping, hunting, and recreation opportunities. Operations that occur that are not in conformance with the Access Management Plan could potentially affect the sustainability of these other important attributes of SFM within the DFA.

The Licensee Team is committed to achieving 100% conformance with the Access Management Plan in order to help reach a balance of values that are derived from the forests within the Vanderhoof DFA. The Access Management Plan will change over time and Licensee Team members will stay informed of changes and continue to work with the Ministry of Forests in order to achieve the target identified for this measure.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team has realized that inconsistencies exist with current conformance tracking. Licensee tracking methodologies will be reviewed as a part of continual improvement to consistently track and report out on access management conformance.

4.16 Effectiveness Monitoring Plans to Improve Access Points

Statement of Measure	Management Objective
1-2.16, 5-1.4, 9-1.2 Effectiveness Monitoring Plans are developed and implemented for selected access management areas to continually improve access points.	Develop Effectiveness Monitoring Plans by September 1, 2005 (+3 month variance).

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** The amount, distribution and diversity of terrestrial and aquatic habitat types, elements and structure important to the maintenance of biological richness are sustained.

- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber forest resources does not decline over time.

- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain opportunities for outdoor recreation activities.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles</p> <ul style="list-style-type: none"> • Element 4.2 – Forest Land Conversion <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.1 – Timber and Non-timber Benefits |
|---|

What is this measure?

A wide variety of access types and features are required in order to provide a balance between ecological, economic and social values. This balance is delivered through the SFMP via the current Access Management Plan. This measure involves the development of a plan that monitors the effectiveness of selected access management and develops ways to improve the success of access management points. The Access Management Plan and associated access management areas are only effective if the access point truly restricts access in the manner stated within the plan. The success of access management also depends on the cost effectiveness of installation, removal and replacement of access restriction features. The Licensee Team has committed to developing a plan to assess these issues and to consider strategies for improvement. As the Ministry of Forests is the steward of the Access Management Plan, their involvement in the development of Effectiveness Plans will be requested, along with other stakeholders and members of the public.

Current practices and state of measure

Access management points are developed in the Vanderhoof DFA through the Access Management Plan, which follows the guidance provided by the LRMP. Access management and subsequent access management points are proposed for land areas that have particular values of interest to the public. These can include areas with angling or hunting restrictions or areas maintained for habitat enhancement. The Ministry of Forests maintains the Access Management Plan with public input and updates to the plan occurring on an annual basis.

Certain access management points within the Vanderhoof Access Management Plan are more effective than others in delivering the type of access restrictions identified through the plan. Effectiveness Monitoring Plans will review the current status of priority access management points based on success rate and economic efficiency. From this initial review, the Licensee Team will develop a plan and submit it to the MOF (current plan steward) to increase overall effectiveness of the Access Management Plan.

How are targets established?

The target of September 1, 2005 is based on the high level of importance that was placed on this measure by both the Licensee Team and the PAG.

How will this measure be implemented, monitored and reported?

Development phases of the Effectiveness Monitoring Plans will be reported out to the PAG prior to September 1, 2005. It is also expected that members of the PAG will be involved in various phases of development of the plans and will be kept informed throughout the process.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, Effectiveness Monitoring Plans to improve access management points did not exist.

b) Implementation of SFMP: Effectiveness Monitoring Plans to improve access management points will be developed and implemented through Forest Development Plans (Forest Stewardship Plans) where applicable. After Effectiveness Monitoring Plans are developed and

implemented, the SFMP may be updated to incorporate a monitoring and reporting strategy to determine the efficacy of these plans.

Forecasting and probable trends of measure

This measure differs from the majority of other measures in that it is targeted at developing a new type of monitoring plan for the Vanderhoof DFA. Therefore, the method used to forecast this measure will also differ from the typical "what if scenario" utilized for other measures. The "what if scenario" analysis will identify why the stated target was chosen for this measure and how it contributes to SFM in the Vanderhoof DFA.

As with previous "what if scenarios", it is useful to identify two potential scenarios:

- a) What if Effectiveness Monitoring Plans for priority access management points were developed considerably earlier than September 1, 2005?
- b) What if Effectiveness Monitoring Plans for priority access management points were developed considerably later than September 1, 2005?

The first scenario suggests that Effectiveness Monitoring Plans for priority access management points would be developed much earlier than September 1, 2005. The most important point to make regarding this scenario is that it is realistically not achievable. As effectiveness monitoring has not been previously developed or implemented within the DFA, considerable review and analysis is required in order to produce a meaningful and useful plan. Operational expertise will be an important part of plan development and a certain timeframe is required in order to produce a valuable end product.

In contrast, the second scenario suggests an extension of the existing target to later than September 1, 2005. A later target date for development of Effectiveness Monitoring Plans would ensure that relevant data and expertise are included in the plan. However, the timeline is not conducive to implementation of this SFMP and movement toward sustainability of the forest resource values identified by the PAG. While it is important to allow adequate time to develop useful strategies, it is also important to actively pursue these strategies in order to move forward with the SFM initiative.

Within the Vanderhoof DFA, future trends will likely show that these Effectiveness Monitoring Plans have been implemented where applicable and that a more efficient access management system exists within the DFA.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Once this plan is developed, this measure will be achieved. Continual improvement of access management will be completed through measure 1-2.15.

4.17 Effectiveness Monitoring Plans for Indicator Species

Statement of Measure	Management Objective
1-3.1 Effectiveness Monitoring Plans (wildlife) are developed and implemented for selected indicator species to test management targets developed for indicators 1-1 and 1-2.	Develop Effectiveness Monitoring Plans by December 31, 2006 (+3 month variance).

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Productive populations of selected species are well distributed throughout the range of their habitat.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity • Element 1.1 – Ecosystem Diversity • Element 1.2 – Species Diversity Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity • Element 2.2 – Ecosystem Productivity

What is this measure?

To determine if productive populations of a selected species are present and well distributed throughout their habitat within the DFA, the Licensee Team will develop and implement an Effectiveness Monitoring Plan for one or more indicator species. These plans will help the Licensee Team determine if current management practices and policies are successful in producing desired populations. As outlined in a report produced by Sarah Madsen et al., an Effectiveness Monitoring Plan evaluates the success of meeting specific objectives and standards for a given species (1999). The primary focus of the Effectiveness Monitoring Plan is in monitoring the status of a population versus monitoring the habitat required to maintain the population. A successful Effectiveness Monitoring Plan is composed of the following elements (Madsen, S. et al. 1999):

- Identification of specific representative species (indicator species)
- Development of reliable and repeatable, cost effective monitoring processes
- Establishment of credible baseline population data
- Monitoring of long-term population changes
- Monitoring and sample designs
- Identification of logistical and statistical sampling problems
- Development and coordination of local and regional implementation and monitoring strategies
- Use of existing data where possible, and if dealing with migratory species, collaborate data with other jurisdictions
- Monitoring and sampling select geographical locations and populations
- Evaluation of the relationship between habitat use and condition, and population densities and trends through predictive models
- Identification of expected timelines, costs and outcomes

Current practices and state of measure

There are currently no Effectiveness Monitoring Plans for indicator species that have been developed or implemented within the DFA.

How are targets established?

The target for this measure was set as December 31, 2006 because the Effectiveness Monitoring Plans for indicator species are complex plans that will require substantial research, monitoring and sampling in order to be completed.

How will this measure be implemented, monitored and reported?

The Licensee Team will report out on interim progress during plan development and will provide the PAG opportunity to review and comment on plans prior to implementation.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, Effectiveness Monitoring Plans for indicator species did not exist.

b) Implementation of SFMP: Effectiveness Monitoring Plans for indicator species will be developed and implemented through Forest Development Plans (Forest Stewardship Plans) and Site Plans, where applicable. After Effectiveness Monitoring Plans are developed and implemented, the SFMP may be updated to incorporate a monitoring and reporting strategy to determine the efficacy of these plans.

Forecasting and probable trends of measure

This measure differs from the majority of other measures in that it is targeted at developing a new monitoring plan for the Vanderhoof DFA. Therefore, the method used to forecast this measure will also differ from the typical "what if scenario" utilized for other measures. An analysis of the "what if scenario" will identify why the stated target was chosen for this measure and how it contributes to SFM in the Vanderhoof DFA.

As with previous "what if scenarios", it is useful to identify two potential scenarios:

- a) What if Effectiveness Monitoring Plans for selected indicator species were developed considerably earlier than December 31, 2006?
- b) What if Effectiveness Monitoring Plans for selected indicator species were developed considerably later than December 31, 2006?

The first scenario suggests that Effectiveness Monitoring Plans for selected indicator species would be developed much earlier than December 31, 2006. The most important point to make regarding this scenario is that it is realistically not achievable. As these plans have previously not been developed or implemented within the DFA, considerable research and development is required in order to produce baseline data for a preliminary Effectiveness Monitoring Plan. In order to develop a meaningful and useful plan, scientific and occupational expertise will be an important part of plan development and a certain timeframe is required in order to produce a valuable end product.

In contrast, the second scenario suggests an extension of the existing target to later than December 31, 2006. While this would ensure the inclusion of relevant scientific data and expertise, the timeline is not conducive to implementation of this SFMP and movement toward sustainability of the forest resource values identified by the PAG. While it is important to allow adequate time to develop useful strategies, it is also important to actively pursue these strategies in order to move forward with the SFM initiative.

As previously mentioned, the idea of Effectiveness Monitoring Plans for indicator species was initiated to ensure that productive populations of a selected species are present and well distributed throughout their habitat within the DFA. Development of Effectiveness Monitoring Plans for indicator species will ensure that future forest practices do not exclude ecosystem and land base attributes that are vital to these species. Within the Vanderhoof DFA, future trends will likely show that these plans have been developed and implemented where applicable. Once Effectiveness Monitoring Plans are developed and implemented, baseline data for indicator species will start to become available and future targets and trends will be easier to identify. Development of Effectiveness Monitoring Plans may involve predictive modeling and forecasting of population levels in relation to other SFM values. Until the indicator species are selected and plans are created, these relationships will not be able to be modeled with any level of certainty.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Once this plan is developed, this measure will be achieved and other measures as tied to indicator species will likely be developed.

4.18 Management Strategies for Species at Risk

Statement of Measure	Management Objective
1-3.2 Develop "Management Strategies" for all Species at Risk.	Develop management strategies for all species at risk within the DFA by December 31, 2006 (+3 month variance).
1-3.3 The percent of Species at Risk "Management Strategies" being implemented as scheduled.	Annually, beginning in 2007, ensure 100% (-5% variance) of species at risk management strategies are being implemented as scheduled.

These measures address the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Productive populations of selected species are well distributed throughout the range of their habitat.

These measures also address the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity • Element 1.2 – Species Diversity

What are these measures?

The development and implementation of various landscape and stand level strategies for biodiversity management will achieve a good portion of the biodiversity needs present in the DFA. Landscape level management approaches are referred to as "coarse filter" techniques because they represent general measures used to conserve a variety of wildlife or plant species. Coarse filter guidelines alone will not be sufficient to ensure the conservation of species that have been given special status in BC, such as those listed as Species at Risk. Fine filter management guidelines are required to ensure that Species at Risk are maintained within the DFA. This measure will ensure that specific, fine filter management strategies are developed and implemented in order to conserve and manage specific habitat needs for all identified Species at Risk.

The habitat requirements for most Species at Risk are fairly well known, which allows planning and development of special management areas or the prescription of activities that will not interfere with the well being of these species. Where possible, management strategies developed for the Vanderhoof DFA will be based on information already in place (e.g. National Recovery Teams of Environment Canada, the Identified Wildlife Management Strategy) and on recent scientific literature. Management strategies will be implemented in operational plans to ensure the development or maintenance of required habitat.

Species at Risk are currently derived from three sources:

- 1) Red Listed Species: Defined by COSEWIC as taxa being considered for or already designated as extirpated, endangered or threatened. Extirpated taxa no longer exist in the wild in British Columbia, but they do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed.
- 2) Blue listed species: Defined by COSEWIC as taxa considered being vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue listed taxa are at a lower level of risk than red listed species.
- 3) Identified Wildlife: Defined by the British Columbia provincial government as those species at risk that require special management attention within the province. These species are listed as Identified Wildlife Management Species (IWMS) and are protected under the Forest Practices Code of British Columbia.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): This committee is comprised of representatives from federal, provincial territorial and private agencies as well as independent experts in order to assign national status to species at risk in Canada.

Current practices and state of measures

Development and implementation of management strategies for Species at Risk requires knowledge of how many forest dependent species inhabit a managed area. While the concept of biodiversity includes all plants and animals of a particular region (BC MOF 1995a), assessing forest dependent species at all community levels is neither feasible nor operationally practical. A review of Species at Risk flora and fauna in relation to the Vanderhoof DFA should ideally consider all forest dependent species. For this measure, the review of fauna will generally focus on terrestrial vertebrates such as mammals, birds, amphibians and reptiles currently identified as provincial red and blue listed species as per COSEWIC, and species from the Identified Wildlife Management Strategy (IWMS) (Government of BC 1997). Plant communities and individual

plants at risk will also be reviewed for the DFA based on a summary listing from the BC Conservation Data Center.

Table 16. Species at risk Flora within the Defined Forest Area by Listing

Scientific Name	Common Name	Global Status*	Provincial Status*	COSEWIC Listing*	BC Status	IWMS Listing
<i>Carex bicolor</i>	two-colored sedge	Secure	Vulnerable to Imperiled	-	Blue	-
<i>Carex sychnocephala</i>	many-headed sedge	Apparently Secure	Vulnerable	-	Blue	-
<i>Glyceria pulchella</i>	slender mannagrass	Secure	Vulnerable to Imperiled	-	Blue	-
<i>Platanthera dilatata</i> var. <i>albiflora</i>	fragrant white rein orchid	Species Secure, subspecies unranked	Vulnerable to Imperiled	-	Blue	-
<i>Polemonium elegans</i>	elegant Jacob's ladder	Apparently Secure	Vulnerable to Imperiled	-	Blue	-
<i>Scolochloa festucacea</i>	rivergrass	Secure	Imperiled	-	Red	-
<i>Senecio plattensis</i>	plains butterweed	Secure	Vulnerable to Imperiled	-	Blue	-
<i>Torreya chloa pallida</i>	Fernald's false manna	Secure	Critically Imperiled	-	Red	-

*definitions provided in glossary in Appendix II

Tables 16, 17 and 18 detail the Species at Risk flora and fauna, and plant communities at risk identified for the Vanderhoof DFA. These tables were developed through a review of previous research projects in and around the Vanderhoof area (Proulx 2000a, 2000b, 2000c), through the Conservation Data Center Vanderhoof Forest District listings and through anecdotal knowledge. Specific, scientific data on Species at Risk present in the DFA has not yet been collected. Until such research is completed, species listed in Table 16 and 17, and plant communities listed in Table 18 will be used to develop and implement management strategies for the Vanderhoof DFA as they apply. Overview information related to each individual Species at Risk flora and fauna identified in Table 16 and 17 can be found in Appendix X.

A plant community is a unit of vegetation with a relatively uniform species composition and physical structure. Plant communities also tend to have characteristic environmental features such as bedrock geology, soil type, topographic position, climate and energy, nutrient and water cycles (Conservation Data Center 2001). Table 18 identifies the plant communities deemed as "at risk" by the Conservation Data Center within the Vanderhoof DFA. Rare plant communities are, almost without exception, climax (old) plant communities. Younger successional stages are quite often considered to be different plant communities, though they eventually develop into climax plant communities. For more information on successional status of the plant communities listed in Table 18, see the Conservation Data Center's website (<http://srmwww.gov.bc.ca/cdc/>).

Table 17. Species at Risk Fauna within the Defined Forest Area by Listing

Scientific Name	Common Name	Global Status*	Provincial Status*	COSEWIC Listing*	BC Status	IWMS Listing
<i>Rangifer tarandus</i> pop. 15	Caribou (northern mountain population)	Species Secure, Population Apparently Secure	Vulnerable to Apparently Secure	Threatened / Special Concern (May 2002)	Blue	Identified (May 2004)
<i>Ursus arctos</i>	Grizzly Bear	Apparently Secure	Vulnerable	Special Concern (May 2002)	Blue	Identified (May 2004)
<i>Martes pennanti</i>	Fisher	Secure	Imperiled	-	Red	-
<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> species	Species Apparently Secure, Population Apparently Secure	Vulnerable	Special Concern (2003) western population only	Blue	Identified (May 2004)
<i>Epiplatys canis</i>	Beaverpond Baskettail	Secure	Vulnerable	-	Blue	-
<i>Asio flammeus</i>	Short-eared owl	Secure	Breeding Vulnerable, Non-breeding Imperiled	Special Concern (1994)	Blue	Identified (May 2004)
<i>Botaurus lentiginosus</i>	American bittern	Apparently Secure	Breeding Vulnerable, Non-breeding Imperiled	-	Blue	-
<i>Grus canadensis</i>	Sandhill crane	Secure	Breeding Vulnerable to Apparently Secure, Non-breeding Imperiled	Not At Risk (1979) <i>G. canadensis tabida</i> assessed	Blue	-
<i>Pelecanus erythrorhynchos</i>	American White Pelican	Vulnerable	Breeding Critically Imperiled, Non-breeding Imperiled	Not At Risk (1987)	Red	-
<i>Acipenser transmontanus</i> pop. 3	White Sturgeon (Nechako River population)	Species Apparently Secure, Population Critically Imperiled	Critically Imperiled	Endangered (Nov. 2003)	Red	-
<i>Oncorhynchus clarki clarki</i>	Cutthroat Trout, <i>clarki</i> subspecies	Species Apparently Secure, Population Apparently Secure	Vulnerable to Apparently Secure	-	Blue	-
<i>Salvelinus confluentus</i>	Bull Trout	Vulnerable	Vulnerable	-	Blue	-
<i>Salvelinus malma</i>	Dolly Varden	Secure	Vulnerable to Apparently Secure	-	Blue	-

*definitions provided in glossary in Appendix II

Species are those that breed in the Vanderhoof Forest District, migrant species are not listed.

Table 18: Plant Communities at Risk in the Defined Forest Area by Listing

Scientific Name	Common Name	Ecosystem Classification Unit	Provincial Rank	BC Status	Area (ha)
<i>Amelanchier alnifolia</i> / <i>Elymus trachycaulus</i>	saskatoon / slender wheatgrass	SBS dk 81	Imperiled	Red	331
<i>Carex lasiocarpa</i> / <i>Drepanocladus aduncus</i>	slender sedge / Drepanocladus moss	SBS mc2 SBS mk1	Vulnerable	Blue	Not Available
<i>Picea engelmannii</i> x <i>glauca</i> / <i>Lonicera involucrata</i> / <i>Petasites frigidus</i>	hybrid white spruce / black twinberry / sweet coltsfoot	SBS dk 06 SBS mc2 05	Vulnerable	Blue	13,819 12,691
<i>Picea engelmannii</i> x <i>glauca</i> / <i>Spiraea douglasii</i>	hybrid white spruce / hardhack	SBS dw3 06	Vulnerable	Blue	384
<i>Picea engelmannii</i> x <i>glauca</i> / <i>Stereocaulon</i> spp.	hybrid white spruce / coral lichens	SBS dw2 00	Critically Imperiled	Red	Not Available
<i>Pinus contorta</i> / <i>Juniperus communis</i> / <i>Oryzopsis asperifolia</i>	lodgepole pine / common juniper / rough-leaved ricegrass	SBS dk 02	Vulnerable	Blue	1,358
<i>Poa secunda</i> ssp. <i>secunda</i> – <i>Elymus trachycaulus</i>	Sandberg's bluegrass – slender wheatgrass	SBS dk 82	Critically Imperiled	Red	582
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i> / <i>Cornus stolonifera</i> – <i>Rosa acicularis</i>	black cottonwood / red-osier dogwood – prickly rose	SBS dk 08	Imperiled	Red	297
<i>Pseudotsuga menziesii</i> / <i>Calamagrostis rubescens</i> – <i>Aster conspicuus</i>	Douglas-fir / pinegrass – showy aster	SBS dw2 04	Vulnerable	Blue	653
<i>Pseudotsuga menziesii</i> – <i>Picea engelmannii</i> x <i>glauca</i> / <i>Ptilium crista-castrensis</i>	Douglas-fir – hybrid white spruce / knight's plume	SBS mk1 04	Vulnerable	Blue	Not Available
<i>Pseudotsuga menziesii</i> – <i>Picea engelmannii</i> x <i>glauca</i> / <i>Rhytidiadelphus triquetrus</i>	Douglas-fir – hybrid white spruce / electrified cat's tail moss	SBS dw2 05	Vulnerable	Blue	40
<i>Pseudotsuga menziesii</i> – <i>Pinus contorta</i> / <i>Cladonia</i> spp.	Douglas-fir – lodgepole pine / clad lichens	SBS dw2 02 SBS dw3 02	Vulnerable	Blue	57 2628
<i>Pseudotsuga menziesii</i> / <i>Pluozium schreberi</i> – <i>Hylocomium splendens</i>	Douglas-fir / red-stemmed feathermoss – stepmoss	SBS dk 04	Vulnerable	Blue	169
<i>Schoenoplectus acutus</i> Deep Marsh	hard-stemmed bulrush Deep Marsh	SBPS mc W15	Vulnerable	Blue	12

Results reflect a 2002 review of plant community Conservation Status Ranks. Biogeoclimatic Site Units 01 and up indicate the community is part of the BC Ministry of Forests site series classification. The number 00 indicates the community is not part of the MOF site series classification.

How are targets established?

The target for the first measure is set for December 31, 2006 due to the extensive information gathering required to develop management plans and the linkage to other Prince George TSA SFM planning processes. The target for the second measure is set at 100% to ensure that the developed management strategies are successfully implemented and then monitored for success based on a yearly review. The intent was to create these management strategies collectively with other Licensee initiatives. Currently, other districts in the TSA are also developing plan strategies for Species at Risk. In order to coordinate and strengthen the effectiveness of maintaining Species at Risk, cooperation with adjacent jurisdictions is preferred. Adjacent districts are currently just beginning the SFM process, and this will influence the progress of these two measures.

How will these measures be implemented, monitored and reported?

Interim Measures: Until management strategies are developed, available and fully implemented, Species at Risk will be managed through the following.

- Consult with wildlife specialists within government agencies and within the private sector when preparing Forest Development Plans (and eventually Forest Stewardship Plans) as appropriate.
- Protect wetlands and other water bodies adjacent to forest operations with riparian management practices.
- No harvesting or constructing roads within Class A Parks, Protected Areas, or ecological reserves.
- Be consistent with the objectives of Wildlife Habitat Areas, where present.
- The Licensee Team is committed to training appropriate staff on how to identify and manage for Species at Risk in the DFA.

An annual review of the management strategy implementation procedure will be completed. The management strategies will be designed so a qualified professional can determine whether or not a particular strategy is implemented, not implemented, or is not applicable to the situation. Developed management strategies will be implemented within Forest Development Plans (and eventually Forest Stewardship Plans) as part of a continual improvement/research strategy for a particular species.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, management strategies for Species at Risk did not exist.

b) Implementation of SFMP: Management strategies for Species at Risk will be developed and implemented through Forest Development Plans (Forest Stewardship Plans) and Site Plans, where applicable. Implementation of these strategies will be monitored through Site Plans and post harvest inspections. After management strategies for Species at Risk are developed and implemented, the SFMP may be updated to incorporate a monitoring and reporting strategy to determine the efficacy of these plans.

Forecasting and probable trends of measures

The first measure differs from the majority of other measures in that it is targeted at developing a new management strategy for the Vanderhoof DFA. Therefore, the method used to forecast this measure will also differ from the typical "what if scenario" utilized for other measures. The second measure, although dependent on the first measure can also be forecasted using a "what if scenario". The following "what if scenario" analysis of both measures will help to identify why the stated targets were chosen for these measures and how they contribute to SFM in the Vanderhoof DFA.

It is useful to identify two potential scenarios for the first measure and one potential scenario for the second measure as follows:

- a) What if management strategies for all Species at Risk were developed considerably earlier than December 31, 2006?
- b) What if management strategies for all Species at Risk were developed considerably later than December 31, 2006?
- c) What if only 50% of management strategies for all Species at Risk were implemented as scheduled?

The first scenario suggests that management strategies for all Species at Risk would be developed much earlier than December 31, 2006. The most important point to make regarding this scenario is that it is realistically not achievable. As these strategies have previously not been developed or implemented within the DFA, considerable research and development is required in order to produce baseline data. In order to develop a meaningful and useful management strategy, scientific and occupational expertise will be an important part of strategy development and a certain timeframe is required in order to produce a valuable end product.

In contrast, the second scenario suggests an extension of the existing target to later than December 31, 2006. While this would ensure the inclusion of relevant scientific data and expertise, the timeline is not conducive to implementation of this SFMP and movement toward sustainability of the forest resource values identified by the PAG. While it is important to allow adequate time to develop useful strategies, it is also important to actively pursue these strategies in order to move forward with the SFM initiative.

The third scenario involves implementation of management strategies for all Species at Risk. If the Licensee Team were to only implement 50% of management strategies for all Species at Risk as scheduled, then adequate attention would not be given to this important measure. Development of management strategies implies a change in certain operational practices in order to better manage for identified species at risk. Implementing only half of these strategies on schedule would allow forest management to proceed without proper caution being given to identified species at risk, should they exist in the DFA. Implementing 100% of management strategies for all Species at Risk will help to ensure that forest practices are not negatively influencing these species by allowing for the best management of the forest resource and the vast array of user groups.

Within the Vanderhoof DFA, future trends will likely show that management strategies for all Species at Risk have been developed and implemented as scheduled where applicable. Once management strategies are implemented, baseline data for species at risk in the DFA will be more readily available and future targets and trends will be easier to identify.

Measure performances and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. For the first measure, once this plan is developed, this measure will be achieved and other measures as tied to Species at Risk may be developed. With regards to the second measure, continual improvement will involve increased knowledge of the interactions between harvesting and Species at Risk.

4.19 Coniferous Seeds and Seedlings Planted in the DFA

Statement of Measure	Management Objective
1-5.1 The percentage of seed for coniferous species collected and seedlings planted in accordance with the Forest and Range Practices Act.	Annually, sustain 100 % (-5% variance) of seed for coniferous species collected and seedlings planted in accordance with the Forest and Range Practices Act.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Biological richness and its associated values are sustained within the DFA.
- **Local indicator:** Genetic diversity of plant species within the Defined Forest Area (DFA) is sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 1 – Conservation of Biological Diversity</p> <ul style="list-style-type: none"> • Element 1.3 – Genetic Diversity |
|---|

What is this measure?

This measure is one of three included in this SFM plan in order to conserve genetic diversity of plant species across the DFA. Genetic diversity is an important aspect of overall biological diversity, however it is difficult to manage due to the complexities of natural systems and plant reproductive patterns. Genetic diversity involves the variability of genes among populations. Well-distributed populations tend to retain genetic variability because the chance of interbreeding and the production of monocultures is decreased. Therefore, sustaining well-distributed populations of plant species is an effective way of ensuring genetic diversity exists.

Sustainability of genetic diversity is an important forest management consideration because harvesting and regeneration activities can interrupt the natural patterns of plant reproduction. While natural regeneration of harvest areas would ensure retention of genetic diversity in managed areas, artificial regeneration of harvested areas can still conserve genetic diversity. Use of genetically diverse tree stock for planting will help to mimic natural processes and help to ensure the maintenance of genetic variability in managed forests. Genetic diversity in managed areas can also be increased where management practices encourage a natural influx of plant species where possible.

Assurance of genetically diverse seedlings for reforestation in the Vanderhoof DFA is delivered through the Ministry of Forests seedlot registration program. When seed is collected from natural

sources, the seedlot program requires that a minimum of 10 trees are used as a seed source in order to increase genetic variability among seed. Seed is also collected from seed orchards where standards for genetic diversity are enforced. Genetic diversity is important to maintain overall gene variability, but it also helps ensure seedling survival. Plants adapt to the growing conditions they experience in natural systems. In order to ensure productivity of artificially regenerated forest stands, the trees most genetically suited to a particular location and climate will have the best survival rates. As such, transfer guidelines have been developed to minimize the risks associated with moving seed or vegetative material from location to location.

Current practices and state of measure

As part of the Forest Practices Code, adherence to the Tree Cone, Seed and Vegetative Materials Regulation was a legislative requirement. With the introduction of the Forest and Range Practices Act this Regulation has since been repealed. New legislative requirements are contained primarily in Section 43 of the Forest and Range Practices Act, which speaks to the use of seed. Licensees must abide by seed and stock transfer guidelines and the Chief Forester may make standards for regulating the use, registration, storage, selection or transfer of seed to be used in the establishment of free growing stands. For the period of April 1, 2003 to March 31, 2004 the Licensee Team sustained approximately 98 % conformance with the requirements of the Forest and Range Practices Act with regards to use of seed and seedling transfers across the DFA.

How are targets established?

The current target of 100% (with a 5% variance) was determined from a review of past practice and the commitment to continue this practice in the future.

How will this measure be implemented, monitored and reported?

Reforestation activities are currently tracked by the Licensee Team using information tracking systems such as Genus rmt. Seedlots and request keys of all planted stock are recorded in these systems as part of the reforestation planning activities and then these items are confirmed after planting. Current practices will continue with the implementation of this SFMP as tracking and monitoring of seedlots will ensure conformance with the Tree Cone, Seed and Vegetative Material Regulation.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, conformance with the Tree Cone, Seed and Vegetative Material Regulation of the Forest Practices Code and later, the requirements of the Forest and Range Practices Act was ensured by tracking and recording seedlots used in reforestation activities.

b) Implementation of SFMP: Practices will not change with the implementation of this SFMP. Although the Tree Cone, Seed and Vegetative Material Regulation is no longer in force, the Forest and Range Practices Act requires that Licensees are still accountable for seed and seedling use that ensures genetic variability across the land base. Seedlot planning and use will continue to be tracked in database systems such as Genus rmt.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is operational in nature. However, it is important to identify what the accepted target means to SFM. Operating under Section 43 of the Forest and Range Practices Act will ensure genetic diversity across the DFA, which in turn will ensure ecological, economic and social returns from the forest resource. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this target identifies a value of 100%, one other scenario should be identified:

- a) What if considerably less than 100% of the seeds for coniferous species collected and the seedlings planted in the DFA were in accordance with the Forest and Range Practices Act?

If considerably less than 100% of the seeds for coniferous species collected and the seedlings planted in the DFA were in accordance with the Forest and Range Practices Act, impacts to all three of the values of SFM could be expected. Reforestation of harvested areas that occurs outside of the Forest and Range Practices Act does not ensure genetic variability of artificial stock or adherence to transfer guidelines of seedlots. Decreases in genetic variability of trees in managed stands would lead to decreased biodiversity in the Vanderhoof DFA. Loss of genetic variability and misplaced seedlots would impact economic values as productivity of tree growth could potentially decrease. With loss of genetic variability leading to decreased ecological and economic values, a decrease in social values would also occur as quality of life would invariably also decrease.

This "what if scenario" analysis implies that a balance of values can be achieved through sustaining 100% of the seeds for coniferous species collected and the seedlings planted in the DFA in accordance with the Forest and Range Practices Act. The Licensee Team is committed to achieving the identified target and promoting sustainability of genetic diversity of artificially regenerated trees across the DFA.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. As part of the continual improvement process, the Licensee Team will continue to explore methods of ensuring genetic diversity of planted trees within their operating areas. As future research evolves, this information will be analysed and adapted where necessary into current forest management practices.

4.20 Site Index

Statement of Measure	Management Objective
2-1.1 Site index for managed stands within the THLB at the subzone level is sustained.	Sustain site index for managed stands within the THLB at the subzone level as outlined in Table 19.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** Soil productivity within the Timber Harvesting Land Base is sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity • Element 2.2 – Forest Ecosystem Productivity Criterion 3 – Conservation of Soil and Water Resources • Element 3.1 – Soil Quality and Quantity

What is this measure?

Site index is defined in this SFMP as the height of a tree at 50 years of age (age is measured at 1.3m above the ground) (refer to glossary in Appendix II). In managed forest stands, site index may be predicted using either the biogeoclimatic ecosystem classification (BEC) for the site, or the Site Index Curve, which uses the height and age of sample trees over 30 years old. Site index is used in timber supply planning to predict future stand volume. In addition, site index is used in silviculture to help make sound management decisions, in forest inventory to describe site quality and update inventory databases, and in wildlife habitat modeling to estimate the amount and size of tree attributes. Site index is very sensitive to changes in ecological site conditions including soil nutrients, soil moisture, and other variables.

Since site index is a physical measure of the growth of trees in a stand at a specified point in time, it provides a good method to evaluate if the productive capacity of the forest is being maintained. Even though trees are just one part of the forest ecosystem, the continued productivity of the trees at a sustained level contributes to the maintenance of productivity of other parts of the forest ecosystem. For example, the continued productivity of trees on the land base provides habitat for flora and fauna, and ensures the recycling of life sustaining elements (e.g. water, carbon, nutrients) between the atmosphere and the soil. Site index is an integral component of timber supply modeling as stands are modeled to grow either more or less volume dependent on site index. Maintaining site index consistent with targets listed in Table 19 is an important test of sustainable harvest levels.

Current practices and state of measure

Site index is a measure of potential productivity of a site and can be impacted, depending upon site disturbance. Generally, if soil productivity is reduced (through compaction or loss of organic layers/nutrients), site productivity is also reduced (site index). The current status of lodgepole pine and spruce site indices in the Vanderhoof DFA are shown in Table 19. Since lodgepole pine

and spruce are the main tree species within natural and managed forests in the DFA, these were the species of choice to measure site index and estimate site productivity.

Current practices involve achieving soil disturbance levels lower than the limits prescribed by the Ministry of Forests, conducting appropriate silviculture treatments, and reforestation with ecologically suitable species. Harvest systems, methods, and the schedule of harvest are all considered to ensure soil productivity is maintained by minimizing soil compaction, disturbance of the duff and exposure of unproductive soil horizons. Sensitive soils are generally harvested in the winter, or with low ground pressure equipment such as specialized ground skidding equipment in the summer.

Table 19. Site Index in the Vanderhoof DFA by Broad BEC Zone

Broad BEC Zones	Species	Current Status as of March 31, 2004* (m)	Target (m)	Variance (%)	Achieved By
Dry SBS	Interior spruce	22.5	>21.4	-5%	5 year rolling average
	Lodgepole pine	21.1	>20.0	-5%	
Moist SBS	Interior spruce	21.0	>19.9	-5%	
	Lodgepole pine	19.9	>18.9	-5%	
ESSF	Interior spruce	20.1	>19.1	-5%	
	Lodgepole pine	17.7	>16.8	-5%	

*The current status measurement comes from Farnden, 2004.

How are targets established?

Baseline targets were determined for each broad BEC subzone group by reviewing the results of a recent site index adjustment project for the Vanderhoof IFPA (see Farnden 2003 and 2004). The purpose of the project was to compare inventory estimates of site with those actually measured in randomly selected ground samples throughout the Vanderhoof Forest District. Field sampling was limited to managed stands with leading lodgepole pine and spruce that were free from overtopping vegetation, free from repression, and free of enhanced spacing or fertilization treatments. A total of 220 field samples were used to define the current status and subsequent targets.

How will this measure be implemented, monitored and reported?

To date, the source of the data to support monitoring this measure has been the 220 field samples established by Farnden (2004). The Licensee Team will review the potential of altering current silviculture survey methodologies to collect additional field data and re-calculate managed stand site index every five years.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, site index was estimated in managed stands during silviculture surveys, generally with the use of Site index-Biogeoclimatic Ecosystem Classification (SIBEC) methods or Site index-Site Unit (SISU) tables. However, this data was never formally monitored.

b) Implementation of SFMP: Site index will continue to be estimated during silviculture surveys using SIBEC, SISU, or other acceptable methods. To formally monitor site index, the Licensee Team will collect more specific site index data every 5 years, potentially through an

alternate silviculture survey methodology. The data used in the SFMP for current status collected by Farnden (2004) will then be re-calculated every 5 years to ensure targets are being achieved across the DFA. This measure will not be implemented through Operational Plans but will be present in Site Plan data.

Forecasting and probable trends of measure

Site index is not an easy attribute to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted targets mean to SFM. Maintenance of site index contributes to biodiversity of ecosystems through conservation of the productive capacity of the land base. An abundance of scientific literature exists regarding site index in British Columbia, including Farnden's "Site index adjustments for the Vanderhoof IFPA" (2004), which was used in the development of this measure. However, to help provide assurance for positive future trends for this measure, a simple "what if scenario" can be used to identify what would occur on the land base should the targets not be met. When forecasting a variable in this manner, it is useful to identify two potential scenarios:

- a) What if site indices were maintained at levels considerably higher than the stated targets?
- b) What if site indices were maintained at levels considerably lower than the stated targets?

The first scenario suggests that site indices would be maintained at levels much higher than the stated targets. The most important point to make regarding this scenario is that it is realistically not achievable. While it is relatively easy to decrease the productivity of a site through poor management practices, increasing a site's overall productivity is quite difficult to do in a short time frame and could potentially be very costly. The major influences to a site's overall productivity are generally climate, soil moisture and soil nutrients. Site productivity increases with warmer climates, with increases to soil moisture and with increases to soil nutrients. Natural ecosystems function at levels that are within a defined natural range of variability. Increasing the productivity of a site might imply moving that site out of its natural range. Climate cannot be easily manipulated by management practices in a short time frame. However, moisture and nutrients can be increased to try and increase the productivity of a site through irrigation and fertilization techniques. Influences of added moisture and nutrients would possibly help increase the productivity of a site, but these additions to the site would need to occur at a regular interval over a long time frame, which would mean serious costs to the forest manager.

In contrast, the second scenario suggests maintaining site indices at levels considerably lower than the stated targets. While this is an easier scenario to achieve operationally, it would not be a benefit to the forest resource and would have a significant negative impact on the ecological, economic and social values of SFM. Site productivity, as in the first scenario, could be altered over time from influences to soil moisture and nutrient levels. Degradation of soil during forestry activities could reduce the productivity of a site in a very short time frame as it could drastically alter soil structure. Soil disturbance and compaction disrupts the natural soil profile and in turn reduces soil nutrients and potentially soil moisture content if the disturbance is high enough. Reduced productivity of sites would lead to poor growth of trees, slower rotations for harvesting and potentially less recreation and public value. Poorly productive sites do not function in the same manner as richer sites and the physical appearance of these sites is very different. While the sites would still produce forests, the natural dynamic of the sites would be altered for a long time period until restoration of the areas was undertaken, if it were even possible.

Within the Vanderhoof DFA, it is anticipated that future trends will show that site indices have been maintained at or slightly above target levels, thereby keeping site productivity within natural ranges.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. In the interest of continual improvement, the Licensee Team may monitor this measure in the future by collecting the necessary site index data as part of the regular silviculture survey protocols. At the completion of the next 5 year rolling average, targets will be reviewed to ensure they accurately reflect what is occurring in the DFA.

4.21 Landslides

Statement of Measure	Management Objective
2-1.2 The number of hectares of landslides resulting from forestry practices.	Annually, landslide areas will be < 20 cumulative hectares across the DFA.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** Soil productivity within the Timber Harvesting Land Base is sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 3 – Conservation of Soil and Water Resources • Element 3.1 – Soil Quality and Quantity

What is this measure?

As defined in this SFMP, a landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows (refer to glossary in Appendix II). For the purpose of this plan and this measure, landslides will be considered as the mass movement of soil or debris covering an area of at least 0.10 hectares in size.

Landslides can be a natural occurrence or can be caused by human influence, such as through industrial activity from forest management. Maintaining sustainable, productive forests requires that the impacts of timber harvesting do not create conditions that may initiate landslides. The primary areas of concern when it comes to potential landslide creation are maintenance of natural water dispersal patterns, avoidance of road cuts in potentially unstable areas, and minimizing soil compaction so as to maintain natural water infiltration rates into soil.

Current practices and state of measure

Landslides are not overly common in the Vanderhoof DFA due to the relatively flat or mildly rolling topography. As such, landslides do not contribute to the overall natural landscape pattern. Landslides that meet the above stated definition have not been reported within the DFA over the

last two-year period. Landslides have not been formally monitored throughout the DFA, however through Licensee's Environmental Management Systems or Standard Operating Procedures, occurrences are reported in incident tracking databases.

How are targets established?

As landslides are not part of the natural pattern of the Vanderhoof DFA and evidence of landslides has not been identified for the last two years, the target was identified based strictly on consensus between the PAG and the Licensee Team. Future information will need to be analysed in order to determine a more meaningful target.

How will this measure be implemented, monitored and reported?

This measure will be monitored throughout the planning, harvesting and silviculture phases. During planning exercises areas with potential stability concerns will be identified and assigned higher risk ratings, which will involve a higher monitoring frequency through other phases. In the event a landslide does occur, woodlands staff will record the incidence during inspections or surveys recording the size of the slide and where it occurred (i.e. within a cutblock, along a road). Once the slide is identified, an investigation of the cause will be completed to determine if forestry activities contributed to the incident. Action plans will then be developed to address significant damage and strategies for improved practice will be proposed. Annually, the incident tracking systems of each Licensee Team member will be reviewed for a summary of the number, size and cause of any landslides and this information will be included in the SFMP annual report.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, occurrences of landslides were reported in individual licensee incident tracking databases, but they were never formally monitored.

b) Implementation of SFMP: Landslide occurrences will be tracked and monitored by the Licensee Team in order to achieve the identified target. Stability concerns will be identified during planning phases through the Forest Development Plan (Forest Stewardship Plan) and this will lead to increased attention and monitoring during site specific phases of development through Site Plans. If landslides occur, tracking of these sites will allow forest managers to investigate cause for future improvement of activities, if required, and will also allow for action plans to be developed to address any damages that may have occurred from the landslide.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame, as it is dependent on natural as well as man-made influences. However, it is important to identify what the accepted target means to SFM. As landslides are not generally a part of the natural disturbance pattern within the Vanderhoof DFA, chances of a landslide occurring are heavily dependent on human driven activities on the land base. Very little scientific research about landslides for the Vanderhoof District exists, as they are an unlikely phenomenon, so it is not entirely certain what effects would occur if more landslides occurred within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a target of ≤ 20 hectares, the "what if scenario" will consist of just one other potential scenario:

a) What if landslides amounted to >20 cumulative hectares of land area across the DFA?

As mentioned previously, landslides are not part of the historical natural landscape pattern within the Vanderhoof DFA. Therefore, if landslide area was to increase to >20 cumulative hectares across the DFA it would imply that either the natural disturbance pattern for the DFA had been altered or that human influences were causing detrimental impacts to soil function and stability. While the latter is a possibility, the former is a more likely situation. The most probable causes of landslides within the Vanderhoof DFA are forest road construction and site preparation activities. Landslides occur due to poor soil stability and this can be increased with increases to soil moisture levels. If the cumulative area of landslides across the DFA were to increase there would be many resulting negative processes. Landslides cause destruction to soil structure, disruption of soil processes and they can eliminate any vegetation that may have been growing in their path. Landslides can also affect water quality with increased sedimentation into natural water bodies. Landslides could potentially affect ecological values through soil disturbance and water quality, economic values through loss of land area for tree growth or access features, and social values through poor aesthetics and potentially reduced access to the forests within the DFA if landslides damage roads and crossings.

Once historical baseline data is collected, historical and current trends will be reviewed and potential future trends will be determined, if possible. The growing number of dead pine stands throughout the DFA may cause an overall increase in the potential for landslides in the short term. Landslide risk may be increased due to the overall increase in soil moisture, as trees are no longer cycling water. Future assessments and monitoring of beetle killed areas will be required in order to assess the actual impact of the mountain pine beetle over time.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will look at continually improving methods of monitoring this measure. Monitoring opportunities may exist in several forms through the use of remote sensing, satellite imagery and supplemental aerial photography. As identified above, the growing number of dead, beetle killed stands will likely increase soil moisture and may result in a higher potential for landslides. A better understanding of the interaction between harvesting these stand types on potentially unstable slopes associated with riparian features is necessary. The Licensee Team will further investigate this measure once base line data is collected.

4.22 Soil Conservation

Statement of Measure	Management Objective
2-1.3 The percentage of blocks meeting soil conservation targets after harvesting and silviculture activities.	Annually, 100% of blocks (-5% variance) will meet soil conservation targets after harvesting and silviculture activities.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** Soil productivity within the Timber Harvesting Land Base is sustained.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity • Element 2.1 – Ecosystem Resilience
Criterion 3 – Conservation of Soil and Water Resources • Element 3.1 – Soil Quality and Quantity

What is this measure?

Soil disturbance is defined in this SFM plan as disturbance caused by a forest practice on an area, including areas occupied by excavated or bladed trails of a temporary nature, areas occupied by corduroyed trails, compacted areas, and areas of dispersed disturbance (see glossary in Appendix II). Some degree of soil disturbance is expected when timber harvesting or silviculture activities take place. However, as soil status plays such a significant role in ecosystem sustainability, site disturbance limits are described in individual Site Plans. All areas proposed for harvest are reviewed to ensure there is adequate protection of soil resources strategies developed for each site in order to carry out activities and remain within acceptable limits.

An objective of placing limits on the amount of acceptable soil disturbance is to ensure that site productivity is conserved and that impacts to other resource values are prevented or minimized (BC MOF 2001b). There are various soil disturbance hazards that must be considered when determining soil disturbance limits. Some of these include soil erosion, soil displacement, and soil compaction (BC MOF 2001b). Minimizing the negative impact caused by various forest management activities conserves soil and the role it plays in the natural environment. This measure will help to ensure that soil disturbance targets are met and that any issues involving excessive soil disturbance are reported so that the necessary mitigation strategies may be employed.

Current practices and state of measure

Various management strategies are employed to reduce soil disturbance during forestry activities and to promote soil conservation. Forest operations are timed seasonally depending on individual site conditions to help minimize soil disturbance. Site information detailing soil hazards is collected during the Site Plan phase and management strategies to conserve soil resources are written into the Site Plan. Prior to the commencement of harvesting activities, EMS pre-work forms are completed that include a soil conservation section where Site Plan strategies are

reviewed. Ongoing inspections occur throughout harvesting activity time frames. An EMS final inspection form is also completed at the end of harvesting to ensure soil disturbance did not exceed targets stated within the Site Plan. Another strategy employed by the members of the Licensee Team is annual soil conservation training with harvesting and silviculture contractors. A review of the Site Plans and completed EMS forms from all Licensee Team members over the period of April 1, 2003 to March 31, 2004 indicates that 99% of operations were completed within the limits identified in the Site Plan.

How are targets established?

The target for this measure was set at 100% in order to sustain soil productivity as defined in the current regulation. As previously mentioned, a review of Licensee Team data indicates that 99% of operations met required soil disturbance targets identified through Site Plans. The Licensee Team will strive to meet this standard with the target for this measure placed at 100%.

How will this measure be implemented, monitored and reported?

Data sources for calculating and monitoring this measure include each Licensee Team member's Site Plans and completed EMS and final harvest inspection forms. Final harvest and site prep inspections will indicate if the soil disturbance targets stated in the Site Plan were met through an ocular survey. If the initial ocular estimate indicates that site disturbance limits may have been exceeded, a transect soil disturbance survey as defined in the Soil Conservation survey guidebook will be completed on the site to determine if the limits have actually been exceeded and if rehabilitation work is required. Ocular survey information (and transect survey data if required) will be tracked so that annual reports can be generated. Results for this measure will be included in the annual report for the SFMP.

Management Modification and Link to Operational Plans:

- a) Status Pre-SFMP:** Prior to the development of this SFMP, management of soil conservation occurred, but it was never formally monitored.
- b) Implementation of SFMP:** Soil conservation will continue to be managed at the site level with management strategies in Site Plans. Final harvest and site preparation inspections will indicate conformance or potential non-conformance with Site Plan direction and this information will be tracked through information systems such as Genus rmt, so that reports can be generated annually for monitoring purposes.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. Maintenance of soil disturbance targets contributes to biodiversity of ecosystems through conservation of site productivity. Scientific research on the effects of soil disturbance is extensive in British Columbia, but it is not entirely certain what effects would occur if soil disturbance targets were not maintained in managed stands. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As the target for this measure is set at 100%, the analysis of one other potential scenario is useful:

- a) What if only 50% of harvested blocks met prescribed soil disturbance targets?

If only 50% of harvested blocks met the soil conservation targets identified in the Site Plan there would be serious impacts to the soil resource across the DFA. Soil disturbance in the Vanderhoof DFA includes soil compaction and puddling, soil displacement, surface soil erosion, and mass wasting. Some forms of soil disturbance are more common in the DFA than others, but it is important to note that the concentration of disturbance is a key factor to overall site productivity. While it is impossible to conduct forest management activities without a certain amount of soil disturbance, dispersal of disturbance across a site is fundamental in lowering the overall impact. That being said, exceeding the prescribed soil conservation targets for harvested areas would ultimately affect ecological, economic and social aspects of SFM. High levels of soil disturbance can alter natural functions of ecosystems and can in turn affect and even alter the vegetation supported by the particular site, which would then potentially affect the wildlife habitat and perceived public value of the area. Excessive soil disturbance can also influence the growth rate of trees, which would in turn affect the economic value derived from the timber resource on the land base. Negative influences to ecological and economic values of forests are linked to the social value derived from the forest resource as well. With less ecosystem productivity and less economic return, social values in the DFA would also potentially decrease due to reduced aesthetic appeal caused by soil disturbance and decreased recreation value from visual influences or potential wildlife declines.

Soil disturbance and failure to achieve prescribed targets could potentially have an extensive negative influence on various SFM values across the DFA. Licensee Team members will strive to ensure that 100% of all cutblocks are consistent with the soil conservation strategies outlined in Site Plans.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The growing number of dead, beetle killed stands will likely increase soil moisture and may result in a higher potential for soil disturbance. A better understanding of the interaction between harvesting these stand types and their soils is necessary. The Licensee Team will further investigate this measure as more information is learned from the influence of mountain pine beetle.

4.23 Productive Forest Area

Statement of Measure	Management Objective
2-2.1 The percentage of productive forest area (hectares) in the THLB.	Annually, sustain 100% of the forest (-5% variance) in the THLB as productive forest.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** The amount of productive forest land and road in the Timber Harvesting Land Base.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity
• Element 2.2 – Ecosystem Productivity
Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles
• Element 4.2 – Forest Land Conversion

What is this measure?

Sustaining the amount of productive forest area within the THLB is an important element in the maintenance of the overall productive capacity of forest ecosystems within the DFA. Productive forest land within the THLB can potentially be reduced by removal of land for other uses. An example of a land removal is through construction of permanent access structures such as roads and landings. This measure focuses on maintaining the current number of hectares in the THLB as productive forest.

Current practices and state of measure

As previously mentioned, the Vanderhoof DFA contains a high percentage of access features primarily due to harvesting of mountain pine beetle infested stands. It is anticipated that the amount of road construction in the future will be minimal, thereby allowing 100% of the forest in the THLB to be maintained as productive forest. The current percentage of productive forest area in the THLB is summarized in Table 20.

Table 20. Current Percentage of Productive Forest in the THLB of the Vanderhoof DFA

Land Classification	Hectares	Current Percent
Productive Forest Land in the THLB	781,462	100%

As long as areas are promptly reforested in the DFA and all silviculture obligations continue to be met, the Licensee Team will be able to continue to maintain 100% of the THLB as productive forest and meet the target requirements of this measure.

How are targets established?

The target for this measure is based on current inventory numbers as determined in the SHIP II Analysis (Timberline 2004c).

How will this measure be implemented, monitored and reported?

Monitoring and reporting of this measure will occur through updates to the road inventory layer and THLB by the Licensee Team.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, the percentage of productive forest area in the THLB was tracked and monitored on 5 year intervals through timber supply analysis.

b) Implementation of SFMP: Productive forest area will be monitored annually through updates to Licensee databases from forest management activities. Road construction and rehabilitation activities will be tracked in the roads inventory (developed through the roads and landings report produced by Timberline (2004d)) in order to balance the amount of productive forest land. Deletions and additions to the THLB will be monitored each year in order to achieve the target of sustaining 100% of the productive forest area in the DFA. This measure will not be implemented through Operational Plans, but will be an important component of Forest Development Planning (Forest Stewardship Planning).

Forecasting and probable trends of measure

This measure was not forecasted by modeling, as it was assumed to remain constant over the long term. However, it is important to identify what the accepted target means to SFM. The percentage of productive forest area in the THLB is a measure that could affect ecological, economic and social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target of 100%, one other scenario should be analysed:

a) What if 50% of productive forest area in the THLB was sustained within the DFA?

If 50% of productive forest area in the THLB was sustained within the DFA, ecological values such as ecosystem diversity and species diversity could be at risk. Loss of productive forest would reduce the available wildlife habitat, thereby reducing wildlife populations in the DFA. As loss of productive forest would primarily be attributed to permanent access structures, there is also an increased risk to water quality due to potential increases in sedimentation levels. From an economic viewpoint, loss of productive forest would reduce the available timber supply, thereby lowering the economic returns to the DFA from the forest industry. Economic returns from non-timber forest products could also potentially decline with a loss of productive forest. Social values in the DFA would likely decrease as a result of the decreases in ecological and economic values. Backcountry recreation opportunities would decrease and the overall economy could decline, thereby lowering the quality of life in the DFA.

Sustaining the productive forest helps to conserve biological richness, economic stability and quality of life within the DFA. The Licensee Team anticipates sustaining 100% of the productive forest and trends for the future will likely show that ecosystem productivity in the DFA stays constant.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. This measure will be reviewed and updated as required to improve relevance to the related indicator.

4.24 Regeneration Delay Date

Statement of Measure	Management Objective
2-3.1, 4-1.3 The percent of harvested blocks meeting the regeneration delay date.	Annually, sustain 100% of harvested blocks (-5% variance) meeting the regeneration delay date

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** Post harvest regeneration on the Defined Forest Area is sustained.
- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Timber harvesting continues to contribute to economic well-being.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity
• Element 2.2 – Ecosystem Productivity
Criterion 5 – Multiple Benefits to Society
• Element 5.2 – Communities and Sustainability

What is this measure?

The Forest Development Plan (FDP) is a landscape plan providing operational planning direction for an entire planning area. The FDP also includes all relevant stocking standards that relate to site level planning (i.e. Site Plans). Forest Stewardship Plans (FSPs) will replace FDPs once FRPA is fully implemented and will serve a similar function as the FDP for this measure.

Regeneration delay is defined in this SFM plan as the time allowed in a prescription between the start of harvesting in the area and the earliest date by which the prescription requires a minimum number of acceptable, well-spaced trees per hectare to be growing in that area. There is a maximum permissible time allowed and comes from standards developed and/or approved by government. The regeneration delay period is usually within two years, where planting is prescribed and five years where the stand is expected to reforest naturally. Ensuring that all harvested stands meet the prescribed regeneration delay date within the specified time frame is an indication that the harvested area has maintained the ability to recover from a disturbance, thereby maintaining its resiliency and productive capacity. It also helps to ensure that a productive stand of trees is beginning to grow for use in future rotations.

Current practices and state of measure

A regeneration survey is completed after planting to ensure adequate stocking of harvested blocks. The current status of this measure was derived from a review of Licensee Team member's records for the time period of April 1, 2003 to March 31, 2004. During this time frame, 99% of harvested blocks in the DFA met the regeneration delay date prescribed in the respective Site Plan.

How are targets established?

The target for this measure is established at 100% in order to ensure that all harvested areas within the DFA are reforested within specified timelines. Achievement of regeneration delay is an integral part of all silviculture management activities so it is vital to have an overall performance target of 100%. However, due to salvage harvesting associated with mountain pine beetle openings are being amalgamated to the original harvest start date, which may result in not achieving the initial regeneration delay targets. This is a relatively short-term anomaly as minor salvage and Bark Beetle Regulation (BBR) harvesting is no longer a common practice over the landscape.

How will this measure be implemented, monitored and reported?

Silviculture obligations such as regeneration delay dates for each harvested stand are recorded and maintained in each Licensee Team member's databases. Each cutblock is surveyed a certain number of years after harvest to ensure reforestation has occurred and that the stand is fully stocked and performing successfully. The results of all surveys are also summarized and maintained in licensee databases. If a survey indicates that the stand has not regenerated successfully, corrective actions will be prescribed immediately in order to remedy the situation while still meeting regeneration delay deadlines. Despite all efforts, some areas will not meet regeneration delay targets and the Site Plan must be amended to extend the critical dates so that continued treatments can be applied to try and regenerate the area.

Once regeneration delay has been achieved, the licensee must submit a report to the Ministry of Forests that will update the status of the cutblock on the government database. These reports are tracked internally by licensees and this measure can be easily tracked and monitored through government reports submitted annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, regeneration delay was tracked by each individual licensee but was never reported out.

b) Implementation of SFMP: Regeneration delay on all harvested blocks will be tracked, monitored and reported out by each Licensee Team member. A standardized method of querying data will be developed by the Licensee Team in order to streamline data collection and ensure accuracy among each source. Regeneration delay obligation dates will continue to be reported through Site Plans, but will be tracked and monitored through databases such as Genus rmt.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through modeling over a defined time frame. However, it is important to identify what the accepted target means to SFM. By ensuring

harvested blocks within the DFA meet the prescribed regeneration delay date, forest managers are ensuring that the productive capability of the land base is conserved and that the forest resource will be available for future use by replenishing the timber supply. Formal scientific data concerning not achieving regeneration delay is not readily available, but from a review of historical forest practices when silviculture activities were not required on Crown land, it is easy to identify the potential impacts of not achieving the target for this measure. Use of a "what if scenario" is beneficial in helping to identify anticipated future trends for a measure such as this. As the stated target for this measure is 100%, one other potential scenario will be analysed:

a) What if only 50% of harvested blocks met the prescribed regeneration delay date?

If only 50% of harvested blocks met the prescribed regeneration delay date the future sustainability of the timber resource within the DFA would be in jeopardy. Regeneration delay is an important achievement date because it is fundamental in determining and maximizing long-term timber supply. Another important aspect of meeting regeneration delay is that by returning trees to a disturbed site, impacts on other forest resource values are minimized. Not achieving regeneration delay on all harvested blocks could allow for potential conversion of blocks to non-forested areas and this would lead to an eventual increase in the silvicultural cost of re-establishing a viable crop of trees on harvested sites.

In the long-term, failing to achieve the identified target for this measure could reduce the ecological values of forest stands, and could also negatively impact the sustainability of economic and social values across the DFA. Within the Vanderhoof DFA, trends for the near future will likely show that regeneration delay will continue to be achieved on 100% of harvested blocks.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will continually improve by trying to lessen the regeneration delay in lieu of operational constraints and the current mountain pine beetle infestation. The Licensee Team will explore the timber supply implications associated with excessive regeneration delay in unsalvaged beetle killed stands.

4.25 Free Growing Date

Statement of Measure	Management Objective
2-3.2, 4-1.4 The percent of harvested blocks meeting the free growing assessment date.	Annually, sustain 100% of harvested blocks (-5% variance) that meet the free growing assessment date.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** Post harvest regeneration on the Defined Forest Area is sustained.
- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Timber harvesting continues to contribute to economic well-being.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <ul style="list-style-type: none"> • Element 2.2 – Ecosystem Productivity <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.2 – Communities and Sustainability |
|---|

What is this measure?

A free growing stand is defined in this SFM plan as a stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees (refer to glossary in Appendix II). The free growing status is somewhat dependent on the regeneration delay date of a forest stand and could be considered the next reporting phase. A free growing assessment is conducted on stands based on a time frame indicated in the Forest Development Plan. The early and late free growing dates are established based on the biogeoclimatic classification of the site and the tree species prescribed for planting after harvest.

In order to fulfil mandates outlines in legislation, standards are set for establishing a crop of trees that will encourage maximum productivity of the forest resource (BC MOF 1995b). The free growing survey assess the fulfilment of a Licensees obligations to the Crown for reforestation and helps to ensure that the productive capacity of the forest land base to grow trees is maintained. Continued ecosystem productivity is ensured through the principle of free growing. This indicator measures the percentage of harvested blocks that meet free growing obligations across the DFA. This will help to sustain the productive capability of forest ecosystems.

Current practices and state of measure

Silviculture obligations, including a free growing standard, for all harvested areas of Crown land have been legally in place since October 1987. A review of Licensee Team member's free growing areas revealed that all stands under obligation are currently meeting the defined free growing time period designated within the Site Plan. However, small areas within a limited number of blocks are currently at risk of not meeting prescribed late free growing dates. As such,

these areas will be assessed and corrective actions will be implemented where possible in order to ensure the stands will reach free to grow status by the amended free growing dates.

The current status of this measure was derived from a review of Licensee Team member's records for the time period of April 1, 2003 to March 31, 2004. During this time frame, 98% of harvested blocks in the DFA met the free growing date prescribed in the respective Site Plan.

How are targets established?

The target for this measure is established at 100% in order to ensure that all harvested areas within the DFA achieve free to grow status within specified timelines. Once cutblocks reach the free to grow standard the area reverts back to Crown land and all Licensee obligations are considered complete. A performance target of 100% is not only achievable, it is in the licensee's best interest as the finalization of silviculture obligations is an important cost benefit for the licensee.

How will this measure be implemented, monitored and reported?

Silviculture obligations such as free growing dates for each harvested stand are recorded and maintained in each Licensee Team member's databases. Each cutblock is surveyed when the free growing dates approach to ensure the free growing standard has been met and that the stand is fully stocked and performing successfully. The results of all surveys are also summarized and maintained in licensee databases. If a survey indicates that the stand has not achieved free growing by the required date, corrective actions will be prescribed immediately in order to remedy the situation while still meeting the late free growing deadlines. Despite all efforts, some areas will not meet the free growing standard by the late date and the Site Plan must be amended to extend the critical dates so that continued treatments can be applied to try and fulfil the free growing obligation.

Once free to grow status has been achieved, the licensee must submit a report to the Ministry of Forests that will update the status of the cutblock on the government database. These reports are tracked internally by licensees and this measure can be easily tracked and monitored through government reports submitted annually at the end of May.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, a block's free to grow status was tracked by each individual licensee but was never reported out.

b) Implementation of SFMP: Free to grow status on all harvested blocks will be tracked, monitored and reported out by each Licensee Team member. A standardized method of querying data will be developed by the Licensee Team in order to streamline data collection and ensure accuracy among each source. Free growing obligation dates will continue to be reported through Site Plans, but will be tracked and monitored through databases such as Genus rmt.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through modeling over a defined time frame. However, it is important to identify what the accepted target means to SFM. By ensuring harvested blocks within the DFA meet the prescribed free growing date, forest managers are ensuring that the productive capability of the land base is conserved and that the forest resource

will be available for future use by replenishing the timber supply. Formal scientific data concerning not achieving free growing is not readily available, but from a review of historical forest practices when silviculture activities were not required on Crown land, it is easy to identify the potential impacts of not achieving the target for this measure. Use of a "what if scenario" is beneficial in helping to identify anticipated future trends for a measure such as this. As the stated target for this measure is 100%, one other potential scenario will be analysed:

a) What if only 50% of harvested blocks met the prescribed free growing date?

If only 50% of harvested blocks met the prescribed free growing date the future sustainability of the timber resource within the DFA would be in jeopardy. Free growing is a set time period in which a licensee has to meet certain requirements on a plantation in order to ensure the stand will continue to be productive and return to a mature forest. Free growing is an important achievement date because it means that the obligation from the Licensee has been fulfilled and the area is ready to revert to Crown land. Achievement of free growing also ensures that the nutrients and productivity of the site have not been significantly altered from harvest and that the land area has not been converted to another type of vegetative cover. The free growing standard is also important to forest management because it is fundamental in determining long-term timber supply.

In the long-term, failing to achieve the identified target for this measure could reduce the ecological values of forest stands, and could also negatively impact economic and social values across the DFA. Within the Vanderhoof DFA, trends for the near future will likely show that free growing dates will continue to be achieved on 100% of harvested blocks.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team has identified several points for continual improvement. Currently, non-conformances generally relate to data base tracking, survey methodology and administrative delays. These issues will be reviewed and a resulting action plan to minimize future negative impacts to this measure will be developed and implemented.

4.26 Active Research Plots Protected from Forestry Activities

Statement of Measure	Management Objective
2-4.1 The percentage of active research plots protected from harvesting and silviculture activities.	Sustain 100% of established, active research plots (-10% variance) protected from harvesting and silviculture activities.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.
- **Local indicator:** Active research plots are not disturbed by forest operations.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| <p>Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <ul style="list-style-type: none"> • Element 2.2 – Ecosystem Productivity |
|--|

What is this measure?

Research and development is important to the maintenance of the long-term capability of forest ecosystems within the DFA. The majority of research data is collected during the life span of a stand of trees. Therefore, harvesting and other forestry management activities can impact field data collection plots and the resulting accuracy of data collected. This measure was designed to ensure the protection of research plots by spatially identifying their locations and ensuring these areas are not included in forest management planning areas.

Current practices and state of measure

The Ministry of Forests is currently completing an inventory of active research plots sites for the DFA, as they are the custodians of this information. The data set is presently 95% complete and contains 18 active research projects with 40 discrete installations of field sites and 101 growth and yield plots located in both immature and mature forest stands. A spatial coverage and any additional research plot locations will be forwarded to the Licensee Team as soon as the inventory is complete. Once these spatial locations are identified, the Licensee Team will compare current approved harvesting operations to ensure these plot locations are not in the target value. Currently MOF review and approve FDP blocks and roads, so conflicts between research plots and development activities are minimized. Any future harvesting and roads building operations will strive to sustain 100% of active research plots in the DFA.

How are targets established?

The target of 100% protection of these research plots was established in order to ensure the protection of research activities within the DFA. Once the precise location of each research site is determined and mapped by the Ministry of Sustainable Resource Management (MSRM), Licensee Team members will minimize potential impacts of these sites from forest management activities.

How will this measure be implemented, monitored and reported?

Licensee Team members will overlay the Ministry's map coverage identifying the locations of research plots on existing and future operational plans to ensure no potential conflicts exist. Where other research plots are identified in the field, the Licensee Team will contact the Ministry of Forests prior to commencement of activities to determine the status of the identified research plot. It is the intent of the Licensee Team to protect the integrity of research plots while concurrently carrying out forest management activities. The Licensee Team will work cooperatively to reach this objective with the Ministry of Forests (MOF) and MSRM. To minimize potential impact to research plots forest management activities may be adjusted by a variety of practices. These include adjusting research plot locations and/or objectives, or adjusting block, road and retention locations, season of harvest, or site preparation activities.

The Licensee Team will report out annually the number of known research plots in comparison to those that are protected from forest management practices.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, active research plots were present in the DFA, but they were never formally monitored, tracked, or reported out by licensees.

b) Implementation of SFMP: Active research plots will be identified by the Ministry of Forests so that Licensees may overlay plot locations on planning and development maps to ensure harvesting operations are not in conflict with the locations of research plots. Locations of plots will occur at the Forest Development Plan (Forest Stewardship Plan) level, whereas mitigation measures to minimize impacts to Active research plots will occur at the Site Plan level. The Licensee Team will report out annually the number of identified research plots and those that have been protected from forest management practices.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it can be affected by natural disturbance events, such as wildfire or mountain pine beetle. However, it is important to identify what the accepted target means to SFM. Research plots are established for a variety of reasons in the DFA, but generally they are designed to monitor forest attributes over a long time frame. The data from research plots can affect both ecological and economic values within the DFA, which in turn would affect social values. Ecologically speaking, research data could be used to alter forest practices so that certain forest attributes are better conserved. In an economic sense, research plots can define local forest attributes, thereby allowing more or less timber harvesting or potentially increases of non-timber forest products depending on the results of the localized research in comparison to provincial data. In light of the connection of this measure to other values, forecasting of this measure is important. The use of a "what if scenario" can be beneficial in identifying anticipated future trends for a measure such as this. As the stated target for this measure is 100%, one other potential scenario will be analysed:

a) What if only 50% of active research plots were protected from harvesting and silviculture activities?

If only 50% of active research plots were protected from harvesting and silviculture activities, it could potentially impact primarily economic values of SFM, but also ecological and social. One of the biggest impacts to harvesting in the location of active research plots would be the loss of

the time and money spent developing and collecting data from these plots. The ecological and social impacts would stem from the loss of representative information on a DFA wide basis. A reduction in the number of plots constitutes less reliability in the data collected from these plots, thereby increasing risks to management for Licensees, but also potential risks to ecosystem health in the DFA and quality of life aspects for the public.

It is expected that the number and type of research plots in the DFA will fluctuate over time and that MSRM and the Licensee Team will work cooperatively to establish future research plots. Natural disturbance events such as the mountain pine beetle epidemic and wildfire will inevitably impact research plots and the quality of information available from these locations. However, the Licensee Team will strive to sustain the identified target and protect 100% of active research plots where harvesting and silviculture activities will conflict.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team realizes the value of research to achieve sustainable forest management. Cooperative establishment of research projects, objectives and locations by industry and government is necessary for continual improvement.

4.27 Total Forest Land and Water Bodies

Statement of Measure	Management Objective
3-1.1 The percent area change of total forested land.	Sustain 0% area change (+/-2% variance) of total forested land. This will be measured at each Timber Supply Analysis period.
3-1.2 The percent area change of water bodies.	Sustain 0% area change (+/-2% variance) of water bodies. This will be measured at each Timber Supply Analysis period.

These measures address the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Forest ecosystem contributions to global ecological cycles are sustained within the DFA.
- **Local indicator:** Ecological cycles – The total forest area and area of water bodies are sustained within the DFA.

These measures also address the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <ul style="list-style-type: none"> • Element 2.2 - Ecosystem Productivity <p>Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles</p> <ul style="list-style-type: none"> • Element 4.2 – Forest Land Conversion |
|---|

What are these measures?

The first measure relates to the amount of area permanently removed from the productive land base in relation to the area harvested during the same period. Conversion of productive forest land can occur in a variety of ways, but certain methods that are common to the Vanderhoof DFA

include access development, area re-assigned to the Agriculture Land Reserve, or area re-assigned to Parks and Protected Areas. Area that is physically converted to non-forest as a result of permanent access or other development is removed from the THLB and no longer contributes to the function of the ecosystem. Areas that are re-assigned for other uses may be converted to non-forest (agriculture use) or may remain in a forested state but not be eligible for timber management (Parks, Protected Areas). Land that is re-assigned does not generally take away from ecosystem diversity or productivity. However, re-assignment does affect the economic return of forest management activities within the DFA. Overall, from a SFM perspective, minimizing the amount of forest land that is converted to other uses will protect the forest ecosystem as a whole and will also help to conserve ecological, economical and social values held by the public within the DFA.

The second measure addresses the percent change in water bodies across the DFA and helps to ensure that these water features are sustained over time. Water bodies are significant to the maintenance of globally important ecological cycles. Therefore, any reduction or percent change in the area of water bodies across the DFA should be monitored. Few forestry activities will cause either a decrease or increase in the area of water bodies over time. However, poor management of forest land adjacent to water bodies could have potential effects on maintaining their current size.

Current practices and state of measures

The area of productive forest land across the DFA will be determined through the Timber Supply Analysis. The number of hectares of water bodies is not broken down in the Timber Supply Analysis and is presented as part of the non-productive land base. Therefore, the number of water bodies present in the DFA will be determined through a GIS exercise. The following table, taken from the SHIP report (Timberline 2004c), summarizes the current break down of the DFA by land classification.

Table 21. Land Base Classification within the DFA

Land Base Classification	Area (ha)	% Total	% Productive
Total Land Base (Gross Area)	1,387,263	100	-
Land not within the TSA	0	0	-
Non-Crown Land (Non-Crown Ownership)	182,454	13.2	-
Non-Forest Land (Non-Productive)	66,103	4.8	-
Total Productive Forest	1,138,706	82.1	100

Practices are currently in place to minimize the reduction of the productive forest land base from the construction of permanent access structures. A roads, trails and landings inventory report was prepared by Timberline(2004d). Within this project and report, existing landings and road widths in the Vanderhoof Forest District were ground truthed to determine if the estimates used in planning actually reflected what exists in the field. It was determined that road and landing area estimates removed too much land area from the THLB. One of the conclusions drawn from the project was that there is actually more productive forest available within the District as non-productive areas are generally over-estimated throughout the planning area. Future forest practices will need to ensure that productive forest land reductions are minimized by:

- Maintaining road widths to a minimum while continuing to provide safe and effective access
- Prescribing temporary roads/trails (eventually reclaimed to productive forest) within Site Plans where roads/trails will not be used for future access
- Using roadside harvesting methods (as opposed to landings) as a preferred harvesting method

The area of water bodies in the DFA was determined through a query of the DFA and included areas designated as Parks. All lakes and wetlands that were classified in the SHIP 2003 analysis were utilized in this query. Areas identified as swamps through this analysis were also included in the query of water bodies for the DFA. Rivers were identified through VRI information, which for the Vanderhoof DFA consisted of the Nechako River. Overall, 104,627 hectares of water bodies were identified for the Vanderhoof DFA, which comprises 9.2% of the Total productive forest (1,138,706 ha) as identified in the SHIP report (Timberline 2004c).

Current practices in place to minimize the percent area change in water bodies across the DFA. These include the use of lakeshore, stream and wetland reserve and management zones to offer protection of water ecosystems.

How are targets established?

Targets for these measures were established from a review of the results of current status and from a review of the reductions to the THLB as identified within the timber supply analysis reports. Targets for both measures are established every five years or in conjunction with DFA and District inventory updates.

How will these measures be implemented, monitored and reported?

The measure surrounding the percent area change of forested land will be monitored through review of the timber supply analysis to determine the percent change in productive forest land. The percent change in the area of water bodies across the DFA will be monitored by initiating the same query that was used to develop the current status. It is important that the same query is used so that a static value is monitored over time. Through implementation of this plan and proper forest management, the percent area change of forest land and the percent area change of water bodies will be non-existent, or at the very least minimal, across the DFA.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, changes to the amount of productive forest land were minimized and changes to the amount of water bodies did not occur, but neither of these were formally tracked, monitored or reported.

b) Implementation of SFMP: Practices to minimize the reduction of the total forested land base and the total area of water bodies will continue within the DFA by the Licensee Team. These practices will be planned at the Forest Development Plan (Forest Stewardship Plan) stage and implemented at the Site Plan stage of development. The percent area change of total forested land and water bodies will be monitored and reported out at each timber supply analysis to ensure targets are met.

Forecasting and probable trends of measures

These measures were not forecasted by modeling, as it is assumed they will remain constant over the long term. However, it is important to identify what the accepted targets mean to SFM. The percent area change of forested land and water bodies are measures that could affect ecological, economic and social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends. As these measures currently have targets of 0%, one other scenario for each measure should be analysed:

- a) What if a 50% change in the area of total forested land occurred in the DFA?
- b) What if a 50% change in the area of water bodies occurred in the DFA?

If a 50% change in the area of total forested land occurred within the DFA, ecological values such as ecosystem diversity and species diversity could be at risk. Loss of forested land would reduce the available wildlife habitat, thereby reducing wildlife populations in the DFA. As loss of forested land could be attributed to permanent access structures, there would also be an increased risk to water quality due to potential increases in sedimentation levels. From an economic viewpoint, loss of forested land would reduce the available timber supply, thereby lowering the economic returns to the DFA from the forest industry. Economic returns from non-timber forest products could also potentially decline with a loss of forested land. Social values in the DFA would likely decrease as a result of the decreases in ecological and economic values. Backcountry recreation opportunities would decrease and the overall economy could decline, thereby lowering the quality of life in the DFA.

If a 50% change in the area of water bodies occurred in the DFA, ecological values such as aquatic habitat and water quality could be at risk. A reduction in the area of water bodies would likely increase the concentration of particulate in that water body. This could decrease the quality of the water and also potentially impact aquatic species. Decreased area of water bodies would also reduce the availability of habitat for aquatic species as temperatures could also be altered with decreased size. Economic values may potentially increase due to the reduced revenue from fishing opportunities and water recreation opportunities at various lodges. The impacts on ecological and economic values would in turn likely decrease social values within the DFA. Quality of life would decrease and the overall satisfaction of the public with the SFM process would decline if the area of water bodies was reduced by 50%.

Sustaining the productive forest helps to conserve biological richness, economic stability and quality of life within the DFA. The Licensee Team anticipates sustaining 100% of the productive forest and trends for the future will likely show that ecosystem productivity in the DFA stays constant.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will evaluate the overall effectiveness of this measure and how it relates to sustainable forest management in the DFA.

4.29 Development of a Carbon Monitoring Plan

Statement of Measure	Management Objective
3-2.1 Carbon Monitoring Plan is developed and implemented for forest ecosystem biomass and carbon pools.	Develop and implement Carbon Monitoring Plan by June 30, 2006 (+3 month variance).

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Forest ecosystem contributions to global ecological cycles are sustained within the DFA.
- **Local indicator:** Carbon – Total forest ecosystem biomass and carbon pools are sustained in the DFA.

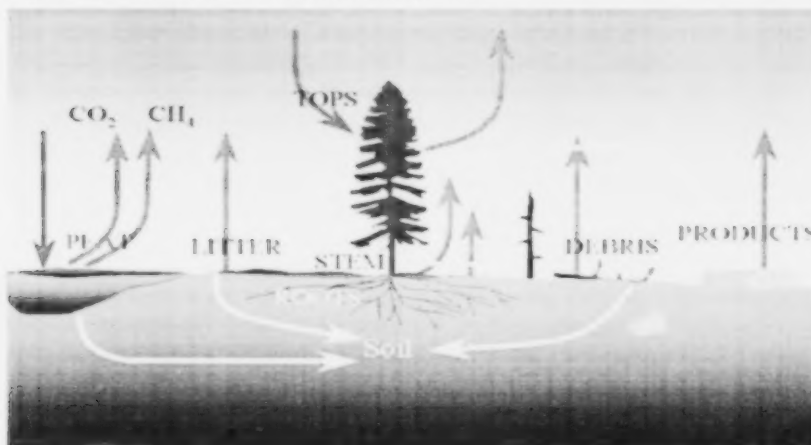
This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles</p> <ul style="list-style-type: none"> • Element 4.1 – Carbon Uptake and Storage |
|---|

What is this measure?

As a result of the 1997 Kyoto protocol, international attention has been focused on the issue of global greenhouse gas emissions. This has placed considerable pressure on the public and private sectors of society to account for the role that forests play in carbon storage and the reduction of global carbon dioxide emissions. The capacity of forest ecosystems to sequester carbon is therefore considered an important environmental value and as such has been included as an aspect of SFM within this plan. In order for carbon sequestration to be effectively represented within an ecosystem level management plan, it must be considered within the context of timber production, wildlife conservation and visual aesthetics. Figure 11 was taken from the CFS Forest Carbon Accounting website (http://www.carbon.cfs.nrcan.gc.ca/cbm-cfs2_e.html) and illustrates the flow of carbon in a forest ecosystem.

Figure 11. Carbon Flow in the Forest Ecosystem

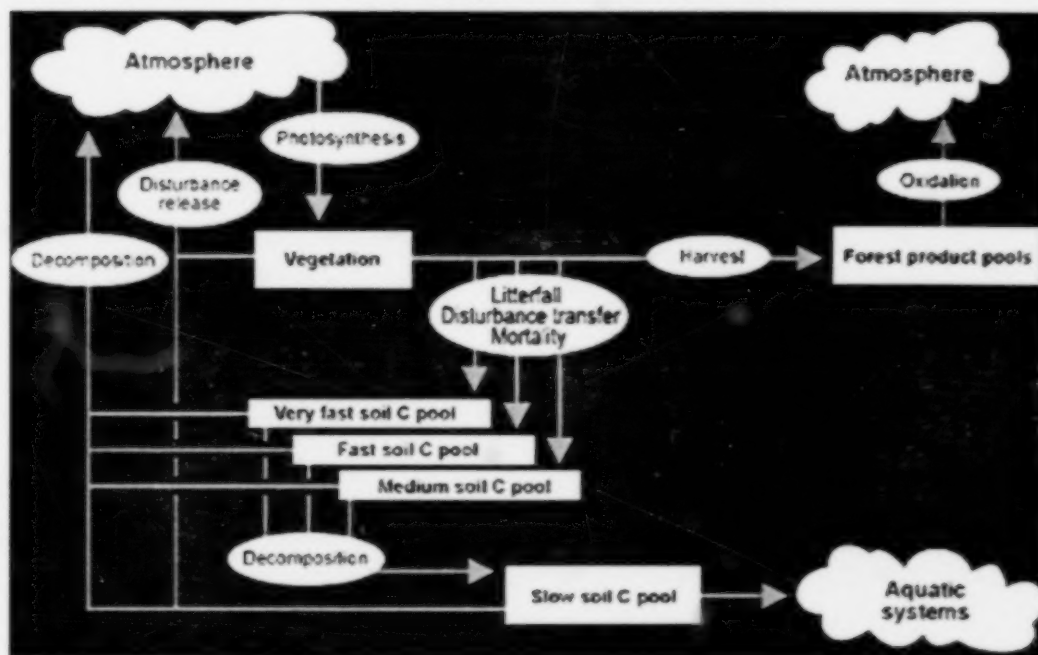


Carbon sequestration is defined as the net amount of carbon removed from the atmosphere and stored in the ecosystem each year. The calculation of average net carbon sequestration rates within a timber supply area allows for a long-term evaluation of the effects of management activities and/or natural disturbance on the rate at which the forested landscape is sequestering carbon. Average sequestration rates are based on the changes in ecosystem carbon storage over time without accounting for carbon removed in the harvested biomass. The rationale behind this is that the carbon in harvested timber will be stored in the wood products following harvest. An assessment of the carbon sequestration rate provides a measure of the rate and the direction of carbon exchange between the forest ecosystem and the atmosphere. This measure will ensure a localized Carbon Monitoring Plan is in place in the Vanderhoof DFA by June 30, 2006.

Current practices and state of measure

There are currently several forest level decision support tools available for assessing carbon sequestration rates. One such tool is the Canadian Forest Services Carbon Budget Model (CBM-CFS2). An overview of this model is presented on the CFS website at http://www.carbon.cfs.nrcan.gc.ca/cbm-cfs2_e.html. This model is a potential candidate for the Vanderhoof Carbon Monitoring Plan because it contains many of the fundamental requirements necessary to achieve SFM objectives identified through this measure. The basic components of the CFS model are summarized in Figure 12, which was taken from the above listed website.

Figure 12. Canadian Forest Service Carbon Budget Model Structural Overview



How are targets established?

Development and implementation of the Carbon Monitoring Plan is set to be completed by June 30, 2006 because of the current lack of localized knowledge and research into carbon modeling. The final plan will require considerable outside help in order to complete and implement by the

target date. Upon further review of the scope of this measure, the Licensee Team feels at risk of not achieving the target for this measure. It is likely that timelines will need to be extended in order to streamline plan development with global, national and provincial initiatives.

How will this measure be implemented, monitored and reported?

Interim phases of plan development will be reported to the PAG for review and comment and the final plan will also be presented to the PAG for overall consensus approval. The final version of the Carbon Monitoring Plan will likely contain targets around forest management activities and accounting processes.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, a Carbon Monitoring Plan did not exist.

b) Implementation of SFMP: A Carbon Monitoring Plan for the DFA will be developed and implemented through Forest Development Plans (Forest Stewardship Plans) and Site Plans, where applicable. After the Carbon Monitoring Plan is developed and implemented, the SFMP may be updated to incorporate a reporting strategy to determine the efficacy of this plan.

Forecasting and probable trends of measure

This measure differs from the majority of other measures in that it is targeted at developing a new monitoring plan for the Vanderhoof DFA. Therefore, the method used to forecast this measure will also differ from the typical "what if scenario" utilized for other measures. An analysis of the "what if scenario" will identify why the stated target was chosen for this measure and how it contributes to SFM in the Vanderhoof DFA.

As with previous "what if scenarios", it is useful to identify two potential scenarios:

- a) What if a Carbon Monitoring Plan is developed and implemented considerably earlier than June 30, 2006?
- b) What if a Carbon Monitoring Plan is developed and implemented considerably later than June 30, 2006?

The first scenario suggests that a Carbon Monitoring Plan is developed and implemented considerably earlier than June 30, 2006. The most important point to make regarding this scenario is that it is realistically not achievable. As these plans have previously not been developed or implemented within the DFA, considerable research and development is required in order to produce baseline data for a preliminary Carbon Monitoring Plan. In order to develop a meaningful and useful plan, scientific and operational expertise will be an important part of plan development and a certain timeframe is required in order to produce a valuable end product.

In contrast, the second scenario suggests an extension of the existing target to later than June 30, 2006. While this would ensure the inclusion of relevant scientific data and expertise, the timeline is not conducive to implementation of this SFMP and movement toward sustainability of the forest resource values identified by the PAG. While it is important to allow adequate time to develop useful strategies, it is also important to actively pursue these strategies in order to move forward with the SFM initiative.

The idea of a Carbon Monitoring Plan to monitor forest ecosystem biomass and carbon pools was initiated to determine the capacity of forest ecosystems to sequester carbon, and the role that forests play in carbon storage and the reduction of global carbon dioxide emissions. Within the Vanderhoof DFA, future trends will likely show that this plan has been developed and implemented. The relationship between carbon pools and carbon monitoring is related to the forecasting initiatives planned for other measures and targets identified in this SFMP. Relationships and future forecasting of carbon issues will be explored within the Carbon Monitoring Plan.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Once the target for this measure is achieved, the measure will be complete. Future continual improvement will be tied to the Carbon Monitoring Plan that is developed and implemented. Global, national and provincial strategies are currently being developed and the Licensee Team will incorporate this information as required.

4.30 Utilization of Residual Wood

Statement of Measure	Management Objective
3-2.2 The percentage of blocks where a portion of the residual wood is utilized or left on-block to contribute to other values.	Sustain $\geq 5\%$ of blocks (-5% variance) where a portion of the residual wood is utilized or left on-block.

This measure addresses the following SFM framework parameters:

- **Value:** Ecological
- **Criterion:** Forest ecosystem contributions to global ecological cycles are sustained within the DFA.
- **Local indicator:** Carbon – Total forest ecosystem biomass and carbon pools are sustained in the DFA.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles</p> <ul style="list-style-type: none"> • Element 4.1 – Carbon Uptake and Storage |
|---|

What is this measure?

This measure was designed to promote the utilization of residual wood fiber that is currently not used post harvest. The amount, distribution and quality of residual wood fiber left in an area post harvest varies depending on the pre-harvest stand characteristics, the harvest method used and the current wood utilization standards. Some examples of this include CWD piles left onsite for small mammal habitat, firewood, or other forest products such as fence posts or biomass for wood pellets. The full range of potential uses of this wood fiber has not yet been fully explored within the DFA. The Licensee Team is currently bound by legislative utilization standards, but support this measure as an attempt to maximize alternate uses of fiber in the working forest.

Current practices and state of measure

Licensee Team members currently use residual wood fiber for the production of CWD piles for small mammal habitat and to meet CWD objectives in harvested areas. Wood below utilization standards is currently not otherwise utilized by the Licensee Team, as there is no current demand in the marketplace. Current practice is roadside processing, which results in large amounts of debris such as tops, limbs, and unmerchantable fiber. Current legislation requires the burning of such debris for fire hazard abatement. Also Licensees strive to maximize the area returned to productive forest. In order to develop other potential uses for this fiber, baseline data must be collected for the number of blocks harvested that have utilized residual wood fiber to construct CWD piles or that have used residual wood to meet overall CWD targets.

The current status of this measure was derived from a review of Licensee Team member's records for the time period of April 1, 2003 to March 31, 2004. During this time frame, 7% of harvested blocks in the DFA had a portion of the residual wood utilized or left on block to contribute to other values.

How are targets established?

The current target of $\geq 5\%$ was reviewed and discussed with the PAG because the Licensee Team felt that base line information would show a low percentage of residual wood use. The intention of establishing the target of five percent or greater was to trend toward higher levels in the future.

How will this measure be implemented, monitored and reported?

Information regarding the requirement and location of CWD piles post harvest is identified within Licensee Team members Site Plans. Post harvest inspections are utilized to ensure Site Plan objectives were met. As this data is generally entered into a database, a query of the number of blocks that had CWD piles constructed will allow monitoring of this measure. Reporting will occur on an annual basis as a percentage of harvested blocks that utilized residual wood fiber. Residual wood that is left on site after site prep activities are complete will remain on site to contribute to other values, such as coarse woody debris.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, residual wood was sometimes prescribed to be left on site in some blocks as coarse woody debris piles for small mammal use.

b) Implementation of SFMP: Strategies for residual wood use or strategies for residual wood to be left on site will be presented in Site Plans. Utilization of logging debris will be investigated as part of continual improvement in order to potentially find alternate wood uses. Coarse woody debris piles will continue to be prescribed on certain sites where small mammal habitat can be utilized. Harvested blocks where residual wood is utilized or left on block for other uses will be tracked and reported out on an annual basis.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is operational in nature. However, it is important to identify what the accepted target means to SFM. Utilization of residual wood or leaving it on-block to contribute to other values will generally affect ecological values of SFM, including wildlife habitat and ecosystem productivity

due to nutrient cycling. Economic and social values may also be influenced through development of alternate wood utilization sources and increased air quality. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends. As the target for this measure is a value greater than or equal to five percent, one other scenario should be analysed:

- a) What if no harvested blocks had a portion of the residual wood utilized or left on-block to contribute to other values?

If no harvested blocks had a portion of the residual wood utilized or left on-block to contribute to other values, overall ecological values within the DFA would decrease. Residual wood potentially would not be available to use in construction of CWD piles, which may decrease the desirable habitat for marten and other small fur-bearers. Other habitat values associated with residual wood in harvested blocks would also decrease, thereby decreasing overall wildlife populations in managed stands within the DFA. No residual wood on harvested sites may also contribute to reduced nutrient cycling, and in the long-term, a reduction of overall site productivity. If alternate utilization methods are developed and the residual wood is not available, then economic values within the DFA could potentially be lessened. A decrease in the ecological and potential economic values would ultimately lead to reduced social values throughout the DFA.

The target for this measure was set to try and reach a balance between the economic and ecological scales of utilizing or leaving residual wood post harvest and not utilizing or leaving any. Therefore, the Licensee Team is committed to achieve the target of $\geq 5\%$ of blocks where a portion of the residual wood is utilized or left on-block, now and in the future. Residual wood that is not utilized and is left on site will also help contribute to other values, for example coarse woody debris.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Timber supply constraints are expected due to the mountain pine beetle epidemic and utilization of non-traditional logging debris may serve to offset these constraints. As residual wood fiber becomes economically viable to harvest, transport and manufacture into alternate forest products the opportunities for continual improvement will increase.

4.31 Annual Volume Harvested by Licensee Team

Statement of Measure	Management Objective
4-1.1, 4-4.1 Annually, total volume (m ³ /ha) of timber harvested in the DFA (Actual).	Sustain a harvest volume of 5,500,000 m ³ /year (+/- 1,000,000 m ³ /year variance) until 2009.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Timber harvesting continues to contribute to economic well being.

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** A competitive, diversified forestry sector exists.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 4 – Forest Ecosystem Contributions to Global Ecological Cycles

- Element 4.1 – Carbon Uptake and Storage

Criterion 5 – Multiple Benefits to Society

- Element 5.1 – Timber and Non-timber Benefits
- Element 5.2 – Communities and Sustainability

What is this measure?

To be considered sustainable, harvesting a renewable resource can not deteriorate the resource on an ecological, economic or social basis. It is expected that certain resource values will be incompatible, however a natural resource is considered sustainable when there is a balance between the various components of sustainability. During Allowable Annual Cut (AAC) determination, various considerations are examined including the long term sustainable harvest of the timber resource, community stability, wildlife use, recreation use, and the productivity of the DFA. The AAC is determined every five years by the Chief Forester of British Columbia, using a number of forecasts to assess the many resource values that need to be managed. On behalf of the Crown, the Chief Forester makes an independent determination of the rate of harvest that is considered sustainable for a particular TSA. This harvest level must then be met within thresholds that are established by the Crown. By following the AAC determination, the rate of harvest is consistent with what is considered by the province to be sustainable ecologically, economically and socially within the DFA.

In the summer of 2004, the Chief Forester completed an expedited Timber Supply Review (TSR) re-determined the AAC for the Prince George TSA and the Vanderhoof Forest District. This review was initiated in order to address the severe mountain pine beetle infestation that currently exists. The Chief Forester examined conservation values, timber supply, management practices, and the various options and implications of increasing volumes of timber harvested. Currently, the re-apportionment of the AAC has not been finalized.

Current practices and state of measure

The current status of Licensee Team volume of cut in the DFA is shown in Table 22, listed by Licensee Team member and by applicable Forest Licence.

Table 22. Licensee Team Current Cut Levels vs. AAC in the Vanderhoof DFA

Licensee and Forest Licence	Actual Recorded Cut
Canfor A40873	716,872.00m ³
Canfor A18165	217,435.00m ³
Canfor A18157	537,208.65m ³ *
L&M A17842	102,514.60m ³ *
L&M A55578	197,698.73m ³ *
Lakeland A18163	34,491.00m ³
BCTS	624,168.00m ³
Other Licences	TBD

*Numbers from Ministry of Forests Cut Control Reports 2003.

**Estimate at this time

How are targets established?

Benchmarking the current harvest levels and looking forward to the next 5 to 10 years is a common method for establishing targets. However, due to the existing mountain pine beetle epidemic in the DFA, increased harvest levels make benchmarking difficult and unpredictable. The Chief Forester apportions AAC within the DFA and The Licensee Team is committed to fulfill its timber harvesting obligations. However the Licensee Team recognizes there will be a lag in actual harvest volume associated with any AAC increase and therefore feel that a current target is representative in the short-term.

How will this measure be implemented, monitored and reported?

The volume of timber actually harvested within the DFA will be determined by a review of MOF timber scale billing summaries for the period of January 1st to December 31st each year, on an annual basis.

Management Modification and Link to Operational Plans:

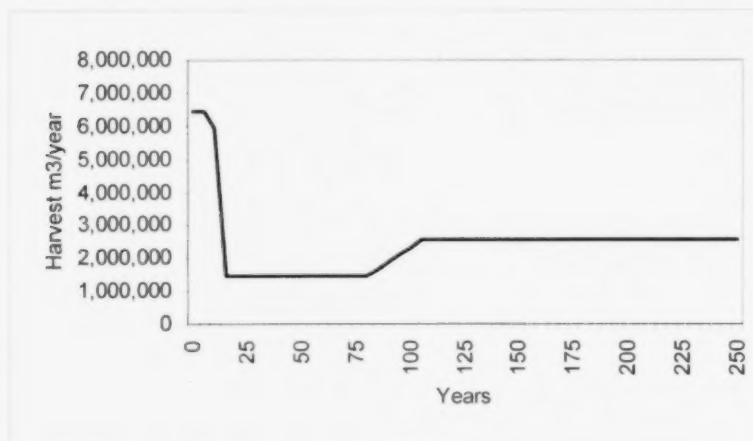
a) Status Pre-SFMP: Prior to the development of this SFMP, the actual volume of timber harvested by licensees was tracked and reported to the Ministry of Forests.

b) Implementation of SFMP: The volume of timber harvested by licensees will continue to be tracked and reported to the Ministry of Forests through scale billings. This volume will be summarized by the Licensee Team and reported annually in the SFMP annual report. This measure will not be implemented directly through Operational Plans, but will be an important component of Forest Development Planning (Forest Stewardship Planning).

Forecasting and probable trends of measure

The actual volume harvested by the Licensee Team will be directly related to the forecasted volume over time as shown in Figure 13 that was produced by Forest Ecosystem Solutions as part of the development of the SFM Scenario. This chart indicates that the recent uplift of AAC to 6.5 million m³/year can be maintained for the first 5 years, after which the harvest forecast decreases down to 6 million m³/year for the next 5-year period.

Figure 13. Forecasted Total Volume Harvested in the Vanderhoof Defined Forest Area



This level of cut will likely not be achieved immediately after the uplift comes into effect, as licensees will need to build up capacity, which may take a few years. This forecast uses year zero as a starting point, but it is currently uncertain when exactly year zero will occur. Ten years following year zero the harvest level must be stepped down to 1.45 million m³ in the medium term in order for forestry to remain a sustainable resource. This harvest level must be maintained until year 80, after which it can be gradually increased to the long-term harvest level of 2.57 million m³/year. This level is reached at year 105.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will work cooperatively with the Ministry of Forests to better estimate the AAC and actual harvest level on an annual basis.

4.32 Total Projected Long Term Timber Supply

Statement of Measure	Management Objective
4-1.2, 4-4.2 Total projected timber supply (m ³ /year).	2,570,000 m ³ /year (+/- 257,000 m ³ /year variance)

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Timber harvesting continues to contribute to economic well being.
- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** A competitive, diversified forestry sector exists.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society

- Element 5.1 – Timber and Non-timber Benefits
- Element 5.2 – Communities and Sustainability

What is this measure?

A long-term sustainable harvest level is a level of harvest that can be maintained indefinitely given a particular forest management regime. The first determination of a long-term sustainable harvest level for the Prince George TSA occurred in the first round of the first TSR (1992-1996). The analysis information that accompanies the TSR is based on the best available information and it provides a timber supply forecast over a span of 250 years while considering various socio-economic and ecological issues. Sensitivities of the timber analysis are tested to evaluate the effects of uncertainty in inventory information and in management practices. TSRs are conducted once every five years, implying that the long term sustainable harvest level can be reviewed within the context of current socio-economic conditions. Ecological considerations can also be made and updated inventory and forest management information can be applied to the TSR.

Forest ecosystems can provide multiple benefits to society so it is important to be able to balance values and non-industrial use of the forest with timber harvesting levels over time. Impacts of forest utilization that occur today will affect future generations. Therefore, it is necessary to be able to plan forest management over centuries so that harvest levels today will not affect the sustainability of the forest resource in the future, even though changes of societal value towards forests will undoubtedly change over time.

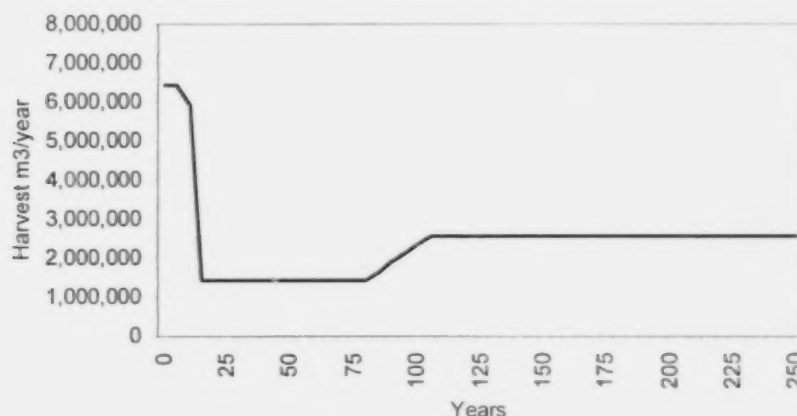
As mentioned in the previous measure, the Chief Forester completed an expedited TSR for the Prince George TSA and the Vanderhoof District in the summer of 2004. The AAC has been re-determined in order to address the severe mountain pine beetle infestation that currently exists. The Chief Forester examined conservation values, timber supply, management practices, and the options and implications of increasing the volume of timber harvested in the DFA. However, the long term DFA target will be to provide a sustainable timber supply forecast for the next 250 years. The expedited TSR is designed to provide the opportunity to fine tune short and long term harvest levels throughout time and be responsive to mountain pine beetle impacts while still considering the long-term sustainability of the forest resource.

Current practices and state of measure

The long-term timber supply is not usually measured, rather it is predicted through timber supply analyses based on the on a set assumptions regarding the land base (productivity etc. as discussed above) and future growth and yield of the future stands.

The recent scenario planning exercise by Forest Ecosystem Solutions Ltd. arrived at a Sustainable Forest Management Scenario for the Vanderhoof DFA with a long-term harvest level of 2.57 million m³ per year. This general level of long-term harvest is different from that predicted by the MOF due to different analysis assumptions. However, the Licensee Team has carried out several analyses in the past utilizing improved and updated data, which were then incorporated into the formation of the SFM Scenario. These analyses support the projected level of long-term harvest. Figure 14 illustrates the total projected timber supply for the DFA as calculated by Forest Ecosystem Solutions.

Figure 14. Total Projected Timber Supply in the Vanderhoof Defined Forest Area



How are targets established?

Targets were established based on a set of agreed upon analysis inputs and the subsequent analyses results. These results show the possible long-term harvest level for the set of assumptions used to define the SFM Scenario.

How will this measure be implemented, monitored and reported?

Periodic timber supply analysis is required to monitor and report out on this measure. Implementation of timber supply analysis and the resulting target for this measure may be conducted by either the Ministry of Forests and/or the Licensee Team.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, the long-term projected timber supply was forecasted by the Chief Forester through the timber supply analysis.

b) Implementation of SFMP: The long-term timber supply forecasted for the DFA through this SFMP differs from the Chief Forester's analysis due to slightly different assumptions. The SFM scenario developed for the DFA attempts to provide a balance of local values over the long-term while also meeting AAC requirements. This measure will not be implemented directly through Operational Plans, but will be an important component of Forest Development Planning (Forest Stewardship Planning).

Forecasting and probable trends of measure

While the MOF was carrying out the expedited TSR, the Licensee Team initiated a scenario planning process with the objective of investigating the impact of alternate harvest forecasts on selected measures and indicators. One of these scenarios, the SFM Scenario, was used to predict harvest flows over time for this plan. This scenario used the most recent AAC as a target for the short-term harvest level (see Figure 14); however, the medium and the long term harvest levels

were not the same as in the MOF analysis due to different analysis assumptions. Particularly, the growth and yield assumptions for future managed stands were different, as the Vanderhoof licensee group have carried out several growth and yield studies to improve their understanding of the growth and yield data.

Forecasting of the long term sustainable harvest level was completed as part of the scenario planning project (FES) and the results are summarized in the following table.

Table 23. Long Term Sustainable Harvest Levels Forecasting Results

Scenario Planning Options	Long Term Sustainable Harvest Level (m3/year)
Base Case	2,680,000
Max Biological Richness	1,731,000
Max Quality of Life	2,509,000
Max Timber Values	3,129,000
SFM Scenario	2,569,000

Further forecasting of this measure will occur during future timber supply analyses, which normally occur in five-year intervals.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will look at adaptive and innovative ways to increase accuracy and long term forecasting of timber supply. The Licensee Team will also explore ways to offset a significant mid-term fall down as a result of mountain pine beetle related mortality.

4.33 North Central Interior Economic Contribution to Forestry in the DFA

Statement of Measure	Management Objective
4-2.1 The percent of money spent on forest operations and management on the DFA provided from the north central interior suppliers (stumpage not included).	Annually, sustain $\geq 80\%$ (-5% variance) of the money spent on forest operations and management from the north central interior.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** The public continues to receive a portion of the benefits.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.2 – Communities and Sustainability • Element 5.3 – Fair Distribution of Benefits and Costs

What is this measure?

The north central interior is defined in this SFMP as the land base that includes communities from 100 Mile House to Fort St. John (south to north) and Terrace to Valemount (west to east) (refer to glossary in Appendix II). The total dollar value of goods and services considered to be local will be calculated relative to the total dollar value of all goods and services used. This calculation will be used to derive the percentage of money spent on forest operations and management of the DFA from suppliers in north central BC.

Forests provide many ecological benefits to areas surrounding them and they also provide substantial socio-economic benefits. In order to have sustainable socio-economic conditions for local communities associated with the DFA, local forest related businesses should be able to benefit from the work that is required in the management of the DFA. Furthermore, for small forestry companies to contribute to and invest in the local economy there must be assurances that there will be a consistent flow of work. In the same way that larger licensees depend on a secure flow of resources to justify investment in an area, small businesses depend on a sustained flow of opportunities to develop and invest in the local community.

Current practices and state of measure

A query of the financial data stored within the Licensee Team's individual accounting systems allows for an indication of the current status of this measure and serves as a methodology to track monies spent within the DFA to benefits the north central interior. From a review of Licensee Team records for the period April 1, 2003 to March 31, 2004, 98.8% of the annual dollars spent within the DFA went to north central interior suppliers. This value is a weighted average based on the current AAC of each Licensee Team member.

How are targets established?

Targets are established from a review of past and expected future performance within the DFA.

How will this measure be implemented, monitored and reported?

This measure will be monitored and reported from Licensee Team accounting systems. The reporting period will be on a fiscal year (April 1st to March 31st).

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, the majority of money spent by the Licensee Team on forest operations and management was provided by north central interior suppliers, but it was never formally monitored and reported.

b) Implementation of SFMP: The Licensee Team will continue to utilize north central interior suppliers for forest operations and management on the DFA. This information will be tracked and queried from Licensee Team accountants and reported out annually to ensure targets are being met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through the modeling process over a defined time frame. However, it is important to identify what the accepted target means to SFM. The use

of a "what if scenario" can be beneficial in identifying anticipated future trends for a measure such as this. The percent of money spent on forest operations and management on the DFA provided from the north central interior suppliers is an important aspect of SFM because it directly relates to sustaining the local economy. As the target for this measure is a value greater than or equal to 80%, one other scenario should be analysed:

- a) What if of the money spent in the DFA for forest operations and management, none was attributable to north central interior suppliers?

If the amount of money spent on forest operations and management on the DFA provided from the north central interior suppliers was 0%, two important values would be at risk. The first, and most important of these would be a reduction in the overall economy of the north central interior. Utilizing services from outside of the north central interior reduces the overall economy and affects local people and businesses. Sometimes, forest managers must look to sources outside of the north central interior if the goods or services they require are not available in this region. Otherwise, money spent outside the north central interior simply reduces the overall economy of these areas.

The second risk to utilizing services from outside of the north central interior is the lack of local knowledge and expertise that would be delivered. Businesses that are located in the north central interior generally conduct most of their activities in this region and therefore have a better understanding of the land base and the ecological responses to different management techniques. By utilizing north central interior suppliers, the public and employees of the forest industry are likely to receive more valuable services based on locally applied knowledge and expertise.

Due to the identified potential impacts this measure could have on the economy and stability of communities in the north central interior, the Licensee Team is committed to achieving the stated target for this measure.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Through benchmarking and by focussing dollars spent on forest operations, the Licensee Team may be able to increase the target levels related to this measure and potentially enhance the level of goods and services purchased within the Vanderhoof DFA, rather than just the north central interior.

4.34 Stumpage Paid Annually on Time

Statement of Measure	Management Objective
4-2.2 The percent of stumpage paid annually on time.	Sustain 100% of stumpage payments (0% variance) paid annually on time.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** The public continues to receive a portion of the benefits.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society

- Element 5.2 - Communities and Sustainability
- Element 5.3 – Fair Distribution of Benefits and Costs

What is this measure?

The payment of stumpage owing on the timber harvested by Licensee Team members is a quantifiable measure of how the public in the Vanderhoof DFA is receiving a portion of the economic benefits derived from forests. It is important to note that the Licensee Team does not control how stumpage royalties are spent across the province, or whether the public receives benefits from stumpage or not. However, it should be assumed that a portion of the royalties received from stumpage will be returned to communities within the DFA.

Forests provide many ecological benefits to areas that surround them and also provide significant socio-economic benefits. In order to ensure continual sustainable socio-economic conditions for local communities associated with the DFA, all stumpage billings will be paid on time.

Current practices and state of measure

A query of the financial data stored within the Licensee Team members accounting systems will allow for an analysis of the current status and future tracking of stumpage payments. Currently all (100%) stumpage payments are made annually on time within the DFA.

How are targets established?

Targets are established from a review of past and expected future performance within the DFA.

How will this measure be implemented, monitored and reported?

The data that will be monitored is available on each Licensee Team member's accounting system and future tracking of this measure will be completed through analysis of accounting records annually. The reporting period will be on a fiscal year (April 1st to March 31st).

Management Modification and Link to Operational Plans:

- a) Status Pre-SFMP:** Prior to the development of this SFMP, stumpage was always paid on time, but this was never formally monitored and reported out.
- b) Implementation of SFMP:** The Licensee will continue to pay stumpage on time and this information will be tracked through Licensee Team accountants and reported out annually. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through the modeling process over a defined time frame. However, it is important to identify what the accepted target means to SFM. The use of a "what if scenario" can be beneficial in identifying anticipated future trends for a measure such as this. The percent of stumpage paid annually on time is an important aspect of SFM because it indirectly relates to sustaining the local economy, and therefore certain aspects of

quality of life for the public. As the target for this measure is stated as 100%, one other scenario should be analysed:

a) What if only 50% of stumpage was paid annually on time?

If only 50% of stumpage was paid annually on time, the overall economy of the DFA would potentially be at risk. Stumpage is a payment made to the Crown by forest Licensees based on the volume of timber harvested from Crown land. Stumpage payments are revenue for the government and this money eventually feeds back into the local economy through various government services, programs or funding opportunities. While Licensees in the DFA have no control how stumpage fees are spent once they are delivered to the government, payment of stumpage fees ensures that the public is ultimately receiving a portion of the economic benefits that are derived from the forest resource. By not making 100% of stumpage payments on time, the public may indirectly be affected through a decrease in the overall economic benefit received from forests. Governments would not be able to return revenue from stumpage fees back to the local economy and the overall quality of life for communities within the DFA would potentially decrease.

Due to the significant impact this measure could have on the local economy, the Licensee Team is committed to continue to pay 100% of annual stumpage payments owing on time.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will explore the effectiveness of this measure in determining whether the public continues to receive economic benefits from the forest industry. Alternative measures may be developed in the future.

4.35 Municipal and Other Taxes Paid Annually on Time

Statement of Measure	Management Objective
4-2.3 The percent of municipal and other taxes paid annually on time.	Sustain 100% of municipal and other taxes (0% variance) paid annually on time.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** The public continues to receive a portion of the benefits.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.2 – Communities and Sustainability • Element 5.3 – Fair Distribution of Benefits and Costs

What is this measure?

Payment of municipal and other taxes owing by the Licensee Team members is a quantifiable measure of how the public is receiving a portion of the economic benefits derived from forests. It is important to note that the Licensee Team does not control how municipal and other taxes are spent, and whether the public within the DFA receives these benefits or not. However, it should be assumed that a portion of the royalties received from taxes will be returned to communities within the DFA.

Forests provide many ecological benefits to areas that surround them and also provide significant socio-economic benefits. In order to ensure continual sustainable socio-economic conditions for local communities associated with the DFA, all future municipal and other taxes will be paid on time.

Current practices and state of measure

A query of the financial data stored within the Licensee Team members accounting systems will allow for an analysis of the current status and future tracking of municipal tax and other tax payments. Currently all (100%) municipal and other taxes are paid annually on time within the DFA.

How are targets established?

Targets are established from a review of past and expected future performance within the DFA.

How will this measure be implemented, monitored and reported?

The data that will be monitored is available on each Licensee Team member's accounting system and future tracking of this measure will be completed through analysis of accounting records annually. The reporting period will be on a fiscal year (April 1st to March 31st).

Management Modification and Link to Operational Plans:

- a) Status Pre-SFMP:** Prior to the development of this SFMP, municipal and other taxes were paid on time, but this was never formally monitored or reported out.
- b) Implementation of SFMP:** The Licensee Team will continue to pay municipal and other taxes on time and this information will be tracked through Licensee Team accountants and reported out annually. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through the modeling process over a defined time frame. However, it is important to identify what the accepted target means to SFM. The use of a "what if scenario" can be beneficial in identifying anticipated future trends for a measure such as this. Like the previous measure involving stumpage, the percent of municipal and other taxes paid annually on time is an important aspect of SFM because it indirectly relates to sustaining the local economy, and therefore certain aspects of quality of life for the public. As the target for this measure is stated as 100%, one other scenario should be analysed:

- a) What if only 50% of municipal and other taxes were paid annually on time?

If only 50% of municipal and other taxes were paid annually on time, the overall economy of the DFA would potentially be at risk. Municipal and other taxes are payments made to communities and governments, and this revenue eventually feeds back into the local economy through various municipal or government services, programs or funding opportunities. While Licensees in the DFA have no control how municipal and other taxes are spent once they are delivered to the municipality or the government, payment of taxes ensures that the public is ultimately receiving a portion of the economic benefits that are derived from the forest resource. By not making 100% of municipal and other tax payments on time, the public may indirectly be affected through a decrease in the overall economic benefit received from forests. Municipalities and governments would not be able to return revenue from taxes back to the local economy and the overall quality of life for communities within the DFA would potentially decrease.

Due to the significant impact this measure could have on the local economy, the Licensee Team is committed to continue to pay 100% of municipal and other taxes paid annually on time.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will explore the effectiveness of this measure in determining whether the public continues to receive economic benefits from the forest industry. Alternative measures may be developed in the future.

4.36 Forest Road Maintained for Public Use

Statement of Measure	Management Objective
4-2.4, 9-1.4 The number of kilometers of forest road maintained annually for public use.	Maintain $\geq$ 300 km of forest road (-30km variance) annually for public use.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** The public continues to receive a portion of the benefits.
- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain opportunities for outdoor recreation activities.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity • Element 1.2 – Species Diversity Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits
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What is this measure?

Roads are a necessary component of forest management as they allow access to the forest resource and its recreational potential. The presence of roads can also affect the environment through alteration of hydrological functions, the potential for erosion and mass wasting, and roads can also adversely affect wildlife populations. Roads need to be carefully planned and access needs to be closely monitored in order to achieve economic efficiency and to mitigate any detrimental effects that may occur.

This measure is a general indicator of the amount of roads that are maintained within the DFA annually to allow the public access benefits to the forest resource. A balance must be met between the value of access to the forest resource, the social costs or benefits, and the ecological costs or benefits in terms of impacts to other resource values such as wildlife. Sustainable forest management pertains to the interaction of ecological, economic and social factors. Therefore, forest managers must be aware that a range of different values and benefits can be derived from the management of forest road access.

Current practices and state of measure

Road maintenance programs are currently tracked through each Licensee Team member's internal data records. The number of roads currently being maintained in the DFA can be identified through these systems. The current status of this measure is 335 km.

How are targets established?

Targets are established from a review of past performance within the DFA.

How will this measure be implemented, monitored and reported?

Each year, The Licensee Team reviews all roads under their responsibility either by flights or by driving each identified road to ensure good working conditions. These are not formal inspections but specific information regarding maintenance or mitigation works is recorded annually during these checks. Mitigation or maintenance issues that are identified are scheduled for subsequent activities through the activity tracking databases of each Licensee Team member. Data used in the analysis of this measure will come from the Licensee Team member's road maintenance information. The Licensee Team will create digital coverage showing all maintained roads within the DFA and this will be updated and monitored annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, roads were maintained for public use, but this information was never formally monitored, tracked and reported.

b) Implementation of SFMP: All operational roads will be reviewed annually through informal inspections to ensure good working conditions. This information will be tracked and any issues that are present will be recorded in an incident tracking database. Mitigation strategies will be employed to ensure roads are maintained and safe for public use. The number of kilometers of road that the Licensee Team maintains for public use will be reported annually to ensure targets are met. This measure will not be implemented directly through Operational Plans, but will be a component of Forest Development Planning (Forest Stewardship Planning).

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is operational in nature. However, it is important to identify what the accepted target means to SFM. Maintenance of forest roads for public use contributes to recreation values, quality of life values and economic values derived from other uses of the forest resource in the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. When forecasting a variable in this manner, it is useful to identify two potential scenarios:

- a) What if no forest roads were maintained for public use?
- b) What if three times the target amount of forest roads were maintained for public use?

If no forest roads were maintained for public use, it is anticipated that recreation opportunities would potentially decrease, certain quality of life values may decline, and economic and social values from non-timber resources may decrease due to limited public access to the forests within the DFA. On the other end of the spectrum, if three times the target amount of forest roads were maintained for public use ecological, economic and social values may all potentially be negatively influenced. While the public may have greater access, wildlife populations may be decreased from a potential increase in hunting activity. Economic values for the forest industry may be impacted by forest Licensees having to spend more money in road maintenance activities within the DFA. Finally, social values may potentially be impacted by adverse affects to wildlife from increased recreation, hunting and fishing opportunities.

This "what if scenario" analysis implies that a balance of values can be achieved through sustaining a level of roads maintained for public use that lies somewhere in between the two scenarios. Although this level has not yet been fully identified through past experience, the Licensee Team is committed to achieving the identified target and adaptively managing forest practices to achieve sustainability.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will evaluate the effectiveness of this measure in assessing the use of maintaining forest roads for the public to determine whether the public continues to receive a portion of the economic benefits from the forest resource.

4.37 Support Opportunities in the DFA

Statement of Measure	Management Objective
4-2.5, 6-1.5, 9-5.1 Annually, the number of support opportunities provided in the DFA.	Annually, sustain ≥ 100 support opportunities (-10 variance) in the DFA.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** The public continues to receive a portion of the benefits.

- **Value:** Economic
- **Criterion:** Forest management contributes to a diversified local economy.
- **Local indicator:** Employment and income sources and their contribution to the local economy continue to be diversified.
- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain support for local organizations within the DFA.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- Criterion 5 – Multiple Benefits to Society
- Element 5.2 – Communities and Sustainability

What is this measure?

This measure indicates how the Licensee Team member companies provide economic and social benefits to the public over and above wages, taxes and stumpage fees through donations and involvement in local community organizations. Types of support opportunities within the DFA vary from providing personnel, equipment and/or facilities, to providing cash and product donations. This measure is an important component of a community's economic and social stability, but it is also difficult to quantify as support opportunities often go unrecorded. Support opportunities help to increase awareness of sustainable forest management and its role within the DFA. This can indirectly lead to building a strong community and creating a viable labor force.

Current practices and state of measure

Each Licensee Team member will determine the current status of support opportunities provided within the DFA and report out on a collaborated total (refer to Table 24).

Table 24. The Number of Support Opportunities in the Vanderhoof DFA

Support Opportunity	Number of Opportunities
Cash Donations	128
Product Donations	0
Resource and Worker Donations	8
Community Events	6
TOTAL	142

How are targets established?

The target was established from a review of past and expected future performance within the DFA.

How will this measure be implemented, monitored and reported?

Support opportunities will be tracked and reported by each Licensee Team member annually, and reported collectively for the DFA.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, support opportunities were present, but they were never formally tracked, monitored and reported.

b) Implementation of SFMP: Support opportunities will be tracked by each Licensee Team member and reported out on an annual basis to ensure targets are being met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through the modeling process over a defined time frame. However, it is important to identify what the accepted target means to SFM. The use of a "what if scenario" can be beneficial in identifying anticipated future trends for a measure such as this. The number of support opportunities provided in the DFA is an important aspect of SFM because it directly relates to sustaining the local economy, and therefore certain aspects of quality of life for the public. As the target for this measure is stated as ≥ 100 , one other scenario should be analysed:

- a) What if the annual number of support opportunities provided in the DFA was considerably less than 100?

If the annual number of support opportunities provided in the DFA was considerably less than 24, the overall economy of the DFA and quality of life for the public could potentially decrease over time. Support opportunities help boost the economy because they can be an indirect economic benefit to the public. If support opportunities were less than 24 annually, local communities would not be receiving an adequate portion of the economic benefits derived from forests through the forest industry. Social values such as quality of life are also tied to annual support opportunities. Local community organizations provide a variety of public benefits and often rely on support opportunities from the forest industry to fund community events. If less than 24 support opportunities were provided annually, many of these community events may not be possible, thereby potentially decreasing the public's quality of life.

Due to the significant impact this measure could have on the local economy and the public's perceived quality of life, the Licensee Team is committed to continue to provide ≥ 24 support opportunities on an annual basis.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. As part of the continual improvement process, the Licensee Team will attempt to determine the effectiveness of certain support opportunities. This process will ensure the public continues to receive a portion of the economic benefits derived from the forest industry.

4.38 Business Opportunities with First Nations

Statement of Measure	Management Objective
4-3.1 Annually, the number of business relationships and opportunities made available and taken up.	Sustain ≥ 12 business relationships or opportunities (-2 variance) annually.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Opportunities to share a portion of the benefits continue to exist for Aboriginal people.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.2 – Communities and Sustainability • Element 5.3 – Fair Distribution of Benefits and Costs

What is this measure?

Providing business relationships, opportunities and cooperative working arrangements with local First Nations to provide mutual social, cultural and economic benefits is an important component to the success of a SFMP. The majority of the Licensee Team's suppliers, contractors and employees are retained from communities within the DFA and northern British Columbia. However, First Nation communities are often not well represented within this distribution, but they are often geographically and economically the most connected to local forest operations. This measure monitors the number of business relationships and opportunities that the Licensee Team's woodlands operations are able to maintain over time with people from local First Nation communities.

A business relationship, in the context of this measure, is defined as a financial arrangement between a person from a local First Nation community and a member of the Licensee Team. It can also be a financial arrangement between a local First Nation person and a third party working on a project that is financially sponsored by a member of the Licensee Team. Whereas, an opportunity, within the context of this measure, is defined as a reasonable chance to form a business relationship like those previously mentioned. It is important to note that a business relationship does not directly relate to the number of contracts administered, as one particular business relationship may be facilitated through a number of contracts covering a variety of projects.

Current practices and state of measure

There are currently 25 business relationships between the Licensee Team woodlands operations and people from local First Nation communities (refer to Table 25). Although the details of these relationships are maintained in confidence, they range in monetary value and variety of project type. Current business relationships include large timber harvesting and development contracts,

silviculture contracts of all types and sizes, forest management partnerships, third party employment arrangements, and short-term daily or weekly hires.

Table 25. Business Opportunities and Relationships made with Local First Nations

Type of Business Relationship or Opportunity	Number of Business Relationships	Number of Business Opportunities	Totals
Forestry Management	1	1	2
Silviculture	9	2	11
Harvesting	9	3	12
TOTAL	19	6	25

How are targets established?

The target for this measure is established from a review of the current business relationships or opportunities in place and reasonable expectations for growth or fluctuations from year to year. Over the long term, the Licensee Team expects to continue to enhance the number and the diversity of business relationships or opportunities that are formed with First Nations.

How will this measure be implemented, monitored and reported?

To administrate this measure, Licensee Team members will report individual achievements and they will be tallied annually as a group in order to ensure the target is being met. To assist with the delivery and eventual reporting of the various business relationships or opportunities across the DFA, each Licensee Team member may further divide these programs into Administrative Zones (e.g. harvesting, silviculture, etc.). Each year, the respective department heads will review the overall targets, performance of the business relationship, and the potential for new relationships within each zone. Contracts will then be initiated to facilitate the delivery of the overall target.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, business relationships and opportunities for First Nations were present, but they were never formally tracked, monitored and reported.

b) Implementation of SFMP: Business relationships and opportunities for First Nations will be tracked by each Licensee Team member and reported out on an annual basis to ensure targets are being met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through the modeling process over a defined time frame. However, it is important to identify what the accepted target means to SFM. The use of a "what if scenario" can be beneficial in identifying anticipated future trends for a measure such as this. The annual number of business relationships and opportunities made available and taken up by local First Nations is an important aspect of SFM because it directly relates to sustaining the local economy. As the target for this measure is a value greater than or equal to six, one other scenario should be analysed:

- a) What if no business relationships and opportunities were made available and taken up by local First Nations?

If there were no business relationships and opportunities made available and taken up by local First Nations, two important values would be at risk. The first, and most important of these would be a reduction in the overall economic well being in local First Nations communities within the DFA. Lack of business opportunities for local First Nations would be detrimental to their ability to build the capacity necessary to share in a portion of the economic benefits associated with forest management in the DFA.

The second risk would involve a reduction or loss of localized First Nation knowledge and experience from that would otherwise not be realized. Local First Nations are often considered to have the most local historical knowledge and experience with the land base in the Vanderhoof DFA. Utilizing this knowledge and experience through potential business opportunities could potentially mutually benefit First Nation communities and the forest industry.

Due to the impact this measure could have on the local First Nations economy, the Licensee Team is committed to achieving the target of ≥ 6 business relationships and opportunities with local First Nations.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team realizes that not all business opportunities made available and taken up are of equal value to First Nations. The Licensee Team will explore a methodology to weigh First Nations realized value of various business opportunities made available.

4.39 DFA Managed under a Fire Preparedness Plan

Statement of Measure	Management Objective
4-5.1, 9-4.3 The percent of the operating area managed under a Fire Preparedness Plan.	Annually, sustain 100% (-5% variance) of the operating area managed under a Fire Preparedness Plan.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Levels of forest damaging events or agents are managed such that their economic impact is minimized.
- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain worker and public safety within the DFA.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity
- Element 2.2 – Ecosystem Productivity
- Criterion 5 – Multiple Benefits to Society
- Element 5.1 – Timber and Non-timber Benefits

What is this measure?

Forest fires have a great potential to damage timber and other ecological, economic and social values associated with the forest resource. Although fire is part of the natural disturbance pattern for the Vanderhoof DFA, fires that burn out of control have the potential to cause significant negative impacts to the forest industry, local economy, community stability and other resource values within the DFA. Another compounding effect within the DFA is the mountain pine beetle epidemic that has created, or has the potential to create vast tracks of dry fuel that would cause extreme wildfire dangers. As such, it is important to have Fire Preparedness Plans in place across the DFA to ensure sustainability of the forest resource for all users.

Current practices and state of measure

Current Legislation and certification processes require Licensees harvesting within the DFA complete an Emergency Preparedness Plan. Currently all Licensee Team members operate under a Fire Preparedness Plan (100%). Preparedness plans are revised on an annual basis and detail staff responsibilities, safety measures and emergency response procedures.

How are targets established?

Targets are established from a review of past and expected future performance within the DFA.

How will this measure be implemented, monitored and reported?

Licensee Team members will supply Fire Preparedness Plans annually for their area of operations as part of their EMS. In order to monitor and report this measure, the percentage of operating areas covered by a Fire Preparedness Plan will be determined, then monitored and reported out on annually.

Management Modification and Link to Operational Plans:

- a) **Status Pre-SFMP:** Prior to the development of this SFMP, most Licensee Team members operated under a Fire Preparedness Plan as it is part of the Environmental Management System (EMS).
- b) **Implementation of SFMP:** All Licensee Team members will have a functioning EMS that is updated to include all necessary aspects of SFM. Fire Preparedness Plans will be updated annually for all operating areas and will be monitored through the EMS. The percentage of operating area covered by a Fire Preparedness Plan will be summarized for the DFA and reported annually. This measure will not be implemented through Operational Plans as it is a component of the EMS.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is operational in nature. However, it is important to identify what the accepted target means to SFM. Forest Fire Preparedness Plans are an important management tool as they help to protect the forest resource and they provide standardized procedures that help to decrease the overall safety risk to forest industry employees and the public. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As the target is currently set at 100%, one other scenario should be identified:

a) What if only 50% of the operating area was managed under a Fire Preparedness Plan?

If only 50% of the operating area was managed under a Fire Preparedness Plan the forest resource could potentially be at risk. Fire Preparedness Plans outline responsibilities and safety procedures to follow when fighting forest fires. If only 50% of the operating area was managed under a Fire Preparedness Plan, the area that was not under a plan would be at a greater risk of wildfire. Areas not managed under a plan would also pose higher safety risks to forest industry employees, stakeholders and any members of the public engaged in wildfire fighting efforts.

Fire Preparedness Plans are part of Environmental Management Systems and allow for better management of fire suppression activities and the tracking of their occurrence. Without these plans, ecological, economic and social values are all at risk of not being sustainable. Therefore, the Licensee Team will continue to have 100% of operating areas managed under a Fire Preparedness Plan.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will work cooperatively with MOF Forest Protection Staff to assist in reducing the economic impacts of wildfire within the DFA.

4.40 Accidental Forest Industry Related Fires

Statement of Measure	Management Objective
4-5.2 The number of hectares of accidental forest industry operational related fires.	Annually, sustain <100 cumulative hectares (+10 hectare variance) of accidental forest industry operational related fires.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Levels of forest damaging events or agents are managed such that their economic impact is minimized.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity
 - Element 2.2 – Ecosystem Productivity
- Criterion 5 – Multiple Benefits to Society
 - Element 5.1 – Timber and Non-timber Benefits

What is this measure?

This measure indicates the losses attributable to accidentally caused industrial forest fires. Although Licensee Team members do not have control over fires ignited by natural causes, a high value has been placed on reducing the impact of these fires on the timber supply. Accidental industrial fires can be caused by various sources, including escapes from the use of prescribed fire (e.g. burning slash piles) or from human induced error (e.g. machinery, cigarette smoking, etc.).

In most situations, industrial fires are brought under control quickly due to the availability of fire fighting equipment and Fire Preparedness Plans. In contrast natural caused fires have the potential to quickly grow in size before fire control efforts are undertaken. However the area and extent of accidental industrial fires must be minimized throughout the DFA in order to contribute to the overall health of the forest and sustainability of the resource for future generations.

Current practices and state of measure

Members of the Licensee Team take precautions to prevent accidental fire ignitions and to reduce the spread of fires once they start. An assessment of each Licensee Team members data surrounding industrial related fires shows that in 2002 and 2003, the area of accidental forest industry related fires was less than 100 cumulative hectares. However, in 2004 the area of accidental fires exceeded 100 cumulative hectares (refer to Table 26). This information was obtained from a review of Ministry of Forests Records. The main cause of accidental industrial related fires in the DFA is the burning slash piles and operating industrial machinery.

Table 26. Accidental Forest Industry Operational Related Fires in the Vanderhoof DFA

Year	Area of Accidental Forest Industry Operational Related Fires (ha.)
2002	49.11
2003	0.18
2004	270

How are targets established?

Targets are established from a review of past performance within the DFA. Licensee Team is however apprehensive in the use of this target due to the current Mountain Pine Beetle epidemic and resulting widespread stand mortality in the DFA. The overall risk of fire starts and large spread is thereby increased.

How will this measure be implemented, monitored and reported?

The British Columbia Ministry of Forests maintains a database of all fires that occur in the province, which includes their cause and their specific location. Members of the Licensee Team will likely be involved in fire suppression activities for fires that occur within the DFA. Therefore, members of the Licensee Team will contact the Ministry of Forests annually in order

to confirm the number of hectares reported as burned along with identification of the source of ignition. Accidental, industrial related fire starts will be monitored annually in order to meet the target identified in this SFMP.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, accidental forest industry related fires were not formally tracked or monitored by licensees.

b) Implementation of SFMP: Accidental forest industry related fires will continue to be tracked through the Ministry of Forests. The Licensee Team will acquire this information from the MOF, summarize it and report it out annually in order to ensure targets are being met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is operational in nature. However, it is important to identify what the accepted target means to SFM. Accidental forest industry operational related fires affect ecological, economic and social values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has the target set at less than 100 hectares, one other scenario should be identified:

- a) What if there were significantly more than 100 hectares of accidental forest industry related fires throughout the DFA?

If there were more than 100 hectares of accidental forest industry related fires throughout the DFA ecological values may benefit due to the historic nature of ecosystems in the DFA. However economic and social values would both be negatively impacted. Loss of human life and property damage could be expected. Timber supply, resource values and visual quality may be compromised, thereby affecting overall economic benefits from forests in the DFA. Loss of visual quality and reduced economic benefits could also potentially reduce quality of life values for the public within the Vanderhoof DFA. Increased risks as a result of wildfire, especially in light of high amounts of tree mortality due to the mountain pine beetle infestation could also potentially negatively affect overall quality of life values.

Negative influences from an increase in accidental forest industry related fires would far outweigh the potential positive ecological gain. Therefore, the Licensee Team will continually place high importance on minimizing the environmental impact of accidental industrial fires. Based on historic information, accidental fires have often been less than 100 cumulative hectares across the DFA. However, in light of the current, mountain pine beetle infestation, it is unknown what the future status of this measure may be.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will work cooperatively with MOF Forest Protection Staff to better determine cause and tracking of accidental industrial caused fires. The Licensee Team members are currently working with Protection staff to develop a Fire Preparedness Plan to counteract the effects of the current, mountain pine beetle infestation within the DFA.

4.41 Management Strategies for Damaging Agents

Statement of Measure	Management Objective
4-5.3 Develop "management strategies" for damaging agents.	Develop various strategies by December 31, 2005 (+3 month variance).
4-5.4 The percent of management strategies in place and implemented to reduce the impact of damaging events or agents (i.e. the annual harvest targeted toward beetles).	Implement 100% (0% variance) of management strategies developed to reduce the impact of damaging events or agents. This will begin to be monitored annually starting in 2006.

These measures address the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of economic benefits from forests through the forest industry is sustained.
- **Local indicator:** Levels of forest damaging events or agents are managed such that their economic impact is minimized.

These measures also address the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 2 – Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <ul style="list-style-type: none"> • Element 2.2 – Ecosystem Productivity <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.1 – Timber and Non-timber Benefits |
|---|

What are these measures?

Damaging agents can be considered as biotic or abiotic factors (e.g. fire, wind, insects, etc.) that reduce the net value of commercial stands of timber. In order to reduce losses to timber value in the DFA caused by damaging agents, the timber must be harvested before the value deteriorates.

The first measure in this section deals with the development of management strategies for damaging agents. Over the last five years, mountain pine beetle populations within the DFA have risen to catastrophic levels causing an epidemic within and in areas surrounding the DFA. In response to this event, the Licensee Team has developed the Strategic Harvest and Investment Planning (SHIP) strategy, through the Vanderhoof IFPA (Timberline 2004c). The SHIP initiative will likely play a major role in the development of a mountain pine beetle damaging agent management strategy. Once the beetle epidemic has moved through the DFA, and the forest will revert to early seral pine stands. At this stage new damaging agents and pests will have to be given serious consideration and managed to reduce future potential losses. Timber supply calculations are based on assumptions considering catastrophic losses. A certain level of loss to damaging agents will exist within a natural ecosystem. If strategies can be developed to minimize these losses from damaging agents, economic benefits can be maximized without creating excessive impacts on social and ecological values.

The second measure is designed to report out on the Licensee Team's success in implementing management strategies designed to minimize losses from various damaging agents. By ensuring that 100% of all actions identified in these plans are completed as scheduled, losses to timber value and other important ecological, economic or social values will be reduced.

Current practices and state of measures

By December 31, 2005, the Licensee Team will have developed various management strategies that will identify and assess damaging agent risks, and introduce management techniques to reduce losses from the effects of these agents. Management strategies will include implementation methods, best management practices and suitable targets for capturing losses from damaging agents. The various strategies will be reviewed by the PAG and targets will be set based on benchmarking of the current practices. Once damaging agent management strategies are developed, the DFA Licensee Team will implement 100% of the actions identified in the strategies.

How are targets established?

The target date of December 31, 2005 for the first measure will allow approximately one year for Licensee Team members to develop a damaging agent management strategy. As the mountain pine beetle epidemic is the damaging agent having the greatest influence within the DFA, it will be the primary damaging agent of focus. The target date will allow for an effective management plan to be developed and will also allow for timely implementation to help mitigate the extensive effects of the mountain pine beetle infestation. It should be recognized that the primary focus of this strategy will be to reduce unsalvageable losses within the DFA.

For the second measure, the target is set at 100% to ensure all management strategies are implemented and that all actions scheduled within the DFA are completed. Damaging agent management strategies will play an important role in sustaining the forest resource, and therefore the target of 100% was established to ensure Licensee Team members continue to operate within the realm of SFM.

How will these measures be implemented, monitored and reported?

With regards to the first measure, Licensee Team members will be responsible to ensure that the required management strategies are developed by the target date. Working groups may be developed during this process to help with strategy development.

Monitoring of the second measure will occur as part of the developed management strategies. Annual assessments will be completed to detect and evaluate the occurrence of damaging agents within the DFA. Once assessments are complete, damaging agent plans will be produced to prioritize and schedule preventative treatments. Any treatments that are scheduled or completed will be tracked in a database. Reports will be generated to identify the strategies implemented.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, management strategies for damaging agents did not exist.

b) Implementation of SFMP: Management strategies for damaging agents will be developed and implemented through Forest Development Plans (Forest Stewardship Plans) and Site Plans, where applicable. Implementation of these strategies will be monitored through Site Plans and post harvest inspections. After management strategies for damaging agents are developed and implemented, the SFMP may be updated to incorporate a monitoring and reporting strategy to determine their efficacy.

Forecasting and probable trends of measures

The first measure differs from the majority of other measures in that it is targeted at developing a new management strategy for the Vanderhoof DFA. Therefore, the method used to forecast this measure will also differ from the typical "what if scenario" utilized for other measures. The second measure, although dependent on the first measure can also be forecasted using a "what if scenario". The following "what if scenario" analysis of both measures will help to identify why the stated targets were chosen for these measures and how they contribute to SFM in the Vanderhoof DFA.

It is useful to identify two potential scenarios for the first measure and one potential scenario for the second measure as follows:

- a) What if management strategies for damaging agents were developed considerably earlier than December 31, 2005?
- b) What if management strategies for damaging agents were developed considerably later than December 31, 2005?
- c) What if only 50% of management strategies in place to reduce the impact of damaging events or agents were implemented as scheduled?

The first scenario suggests that management strategies for all damaging agents would be developed much earlier than December 31, 2005. The most important point to make regarding this scenario is that it is realistically not achievable. As these strategies have previously not been developed or implemented within the DFA, considerable research and review is required in order to produce baseline data. In order to develop a meaningful and useful management strategy, scientific expertise will be an important part of strategy development and a certain timeframe is required in order to produce a valuable end product.

In contrast, the second scenario suggests an extension of the existing target to later than December 31, 2005. While this would ensure the inclusion of relevant scientific data and expertise, the timeline is not conducive to implementation of this SFMP and movement toward sustainability of the forest resource values identified by the PAG. While it is important to allow adequate time to develop useful strategies, it is also important to actively pursue these strategies in order to move forward with the SFM initiative.

The third scenario involves implementation of management strategies for damaging events or agents. If the Licensee Team were to only implement 50% of management strategies for damaging events or agents as scheduled social and economic losses within the DFA can be expected. Implementing only half of these strategies on schedule would allow forest-damaging agents to continue unabated. Therefore allowing forests timber values to be reduced, which would lead to a decrease in social and economic values. Implementing 100% of management strategies for all damaging events or agents will help to ensure best management of the forest resource.

Within the Vanderhoof DFA, future trends will likely show that management strategies for all damaging agents have been developed and implemented as scheduled, where applicable. It should be noted that endemic losses to damaging agents will persist throughout the DFA as part of the natural ecological balance of forest ecosystems. These losses will help to sustain natural ecological processes within the DFA and should not be considered a risk to SFM. Capturing losses associated with large scale damaging events will have a large impact on forecasting the flow of long-term economic benefits from forests. While there will be no specific modeling

associated with this particular measure, modeling techniques could potentially be part of the damaging agent management strategies that are developed.

Measure performances and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team may explore potential external partnerships in the development of scientifically based damaging agent management strategies.

4.42 Conservation of Cultural Features

Statement of Measure	Management Objective
5-1.5, 9-3.1 The percent of Site Plans conserving unique or significant identified cultural features.	Annually, sustain 100% (0% variance) of the Site Plans that conserve unique or significant cultural features when they are identified.
5-1.6, 9-3.2 The percent of forest management operations consistent with the conservation of unique or significant identified cultural features.	Annually, sustain 100% (-5% variance) consistency between forest management operations and the strategies identified in the Site Plan to conserve cultural or significant features.

These measures address the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber forest resources does not decline over time.

- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Forest management conserves the unique or significant cultural features within the DFA.

These measures also address the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits Criterion 6 – Accepting Society's Responsibility for Sustainable Development • Element 6.1 – Aboriginal and Treaty Rights

What are these measures?

The protection and maintenance of culturally unique or significant features gives assurance that these values will be identified, assessed and their record available to future generations. As stated in this plan, a Cultural Feature is a unique or significant place or feature of social, cultural or spiritual importance, such as an archaeological site, recreation site or trail, cultural heritage site or trail, historic site or a protected area (refer to glossary in Appendix II). Cultural features often incorporate First Nation's heritage and spiritual sites, but they can also involve features protected

and valued by non-aboriginal people. Maintenance of culturally unique or significant features is an important aspect to sustainable forest management because this measure contributes to respecting the social and cultural needs of people who traditionally and currently use the DFA for the maintenance of traditional aspects of their lifestyles.

The first measure in this section ensures that all Site Plans that have identified cultural or significant features in the area of the plan also have identified strategies in the Site Plan to ensure the feature is conserved. The second measure is designed to ensure that those Site Plans with identified strategies to conserve cultural or significant features have those strategies implemented on the ground.

Current practices and state of measures

Forest Development Plans use an Archaeological Predictive Model to assess the potential presence of archaeological resources within proposed harvest areas or road access corridors. Where activities are proposed within zones of high archaeological potential, Licensee Team members conduct site level Archaeological Impact Assessments (AIAs) to identify, assess and record any archaeological resources that may be present. Mitigative measures recommended by the archaeologist are incorporated into Site Plans.

Archaeological sources are primarily related to First Nations within the Vanderhoof DFA, as they were the early inhabitants of the land base. However, an AIA is not biased toward Aboriginal features. Archaeological features that relate to non-Aboriginal people may include artifacts from historical trappers and prospectors, or evidence of old trails and remnants from inhabitants of old lakeside cabins. Features such as these are also identified in AIA surveys and management strategies are developed where required to conserve cultural heritage for both Aboriginal and non-Aboriginal interests.

An analysis of previous practices shows that 100% of all Site Plans that identify cultural or significant resources also have strategies in place to conserve these resources. Conservation strategies are implemented at the site level during harvesting operations so that all identified cultural or significant features will be conserved for future generations. If a non-conformance with the Site Plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so that issues can be tracked and mitigated as required.

Once a strategy to conserve unique or significant cultural features is included within a Site Plan document, there is a legal obligation for the licensee to implement and adhere to the strategy. Harvest and subsequent silviculture inspections ensure that these strategies are implemented as stated in the Site Plan document. Currently, 99% of forest operations within the DFA are consistent with completed Site Plans.

How are targets established?

Targets for these measures were both established at 100% because the identification and conservation of cultural or significant features is paramount to First Nations.

How will these measures be implemented, monitored and reported?

The data that is required to monitor the first measure is a summary of the number of Licensee Team Site Plans that identify unique or significant cultural features, and a summary of the

number of these plans that prescribe conservation strategies for these features. This information will be collated and reported out by the Licensee Team annually.

The data that is required to monitor the second measure includes a summary of the number of forest management operations conducted under Site Plans that are consistent with the strategies identified to conserve culturally unique or significant features. This information will also be collated and reported out by the Licensee Team annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, cultural features were identified and conserved through Site Plans, but they were never formally tracked, monitored and reported after harvest.

b) Implementation of SFMP: Cultural features will continue to be assessed through Archaeological Impacts Assessments (AIAs) as part of the Site Plan. Post harvest surveys will determine conformance with Site Plan strategies and incidents of non-conformance will be recorded in an incident tracking database. The percentage of blocks where cultural features were conserved through Site Plans and the percent of forest operations consistent with these conservation strategies will be tracked, monitored and reported out annually.

Forecasting and probable trends of measures

These measures are not easy to quantifiably forecast over a defined time frame, as they are operational in nature. However, it is important to identify what the accepted targets mean to SFM. Conservation of unique or significant identified cultural features primarily influences social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for measures such as these. As these measures currently have targets set at 100%, one other scenario for each should be identified:

- a) What if only 50% of Site Plans conserved identified unique or significant cultural features?
- b) What if only 50 % consistency occurred between forest management operations and strategies identified in the Site Plan to conserve cultural or significant features?

Each of these "what if scenarios" would have similar impacts to SFM within the Vanderhoof DFA. Identifying only 50% of unique or significant cultural features and implementing only 50% of strategies to protect these features would lead to significant cultural loss to both First Nations and the general public within the DFA. Contributions to planning processes by each group would likely be reduced. Aboriginal communities may no longer become involved as potential infringement of unresolved treaty rights could occur if unique or significant cultural features are not fully conserved. Members of the general public may also lose faith in forest management and planning processes if cultural heritage of the Vanderhoof DFA was not recognized as an important value.

The above "what if scenario" helps to identify some of the potential future impacts of not achieving the stated targets for this measure. Therefore, the Licensee Team will continue to ensure that 100% of all harvested areas conserve unique or significant cultural features identified and outlined in the Site Plan, and ensure related strategies are implemented on the ground. Licensee Team members will continue to conduct pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in the Site Plan are met. These initial, in between and final

checks are part of each Licensee Team member's EMS/SOP and the future trend of this measure will remain at the target of 100% if all processes and protocols are followed.

Measure performances and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will investigate the possibility of increasing the accuracy of predicting the presence of archaeological sites. The Licensee Team, in cooperation with First Nations, the public and local archaeologists, will explore the effectiveness of strategies utilized to minimize impact to cultural resource features.

4.43 Conservation of Range Resources

Statement of Measure	Management Objective
5-1.7 The percent of Site Plans conserving range resources for those areas that have identified range resources.	Annually, sustain 100% (0% variance) of the Site Plans that conserve range resources when they are identified.
5-1.8 The percent of forest management operations consistent with the conservation of range resources identified in Site Plans.	Annually, sustain 100% (-5% variance) consistency between forest management operations and the strategies identified in the Site Plan to conserve range resources.

These measures address the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber forest resources does not decline over time.

These measures also address the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.1 – Timber and Non-timber Benefits <p>Criterion 6 – Accepting Society's Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.1 – Aboriginal and Treaty Rights |
|---|

What are these measures?

Conservation of identified range resources will help to assure that these resources will be available to future generations. Range resources can include grazing or hay cutting permits, or areas with potential for these ventures. Range managers and forest managers share the forest resource for their particular purpose, and must work cooperatively in order to achieve sustainable development and management of the forest resource. The first measure in this section ensures that all Site Plans that have identified range resources in the area of the plan also have identified strategies in the Site Plan to ensure the identified resources are conserved. The second measure is designed to ensure that those Site Plans with identified strategies to conserve range resources have those strategies implemented on the ground. Maintenance of range resources is an important aspect to sustainable forest management because as these measures contribute to respecting the social and economic needs of people who traditionally and currently use the DFA

for other resource purposes besides forestry. These measures will help to ensure that various range resources are conserved for future generations.

Current practices and state of measures

The Ministry of Forests regulates range resources under the Forest and Range Practices Act. Range Use Plans are developed and approved by government and these plans contain management specifics governing the range resource. The FDP contains general management strategies to mitigate negative impacts to the range resource where harvesting is proposed within a range tenure. Site level specific detail is contained within subsequent Site Plans.

An analysis of previous practices shows that 100% of all Site Plans that identify range resources also have strategies in place to conserve these resources. Conservation strategies are implemented at the site level during harvesting operations so identified range resources will be conserved for future generations. If a non-conformance with the Site Plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so that issues can be tracked and mitigated as required.

Once a strategy to conserve a range resource is included within a Site Plan document, there is a legal obligation for the licensee to implement and adhere to the strategy. Harvesting and silviculture inspections ensure that strategies are implemented as stated in the Site Plan document. Currently, 100% of forest operations within the DFA are consistent with completed Site Plans.

How are targets established?

Targets for these measures are established at 100% because the identification, conservation and co-management of range resources can be accomplished in a SFM environment.

How will these measures be implemented, monitored and reported?

The data that is required to monitor the first measure is a summary of the number of Licensee Team Site Plans that identify range resources, and a summary of the number of Licensee Team Site Plans that prescribe conservation strategies for these resources. This information will be collated and reported out by the Licensee Team annually.

The data that is required to monitor the second measure includes a summary of the number of forestry management operations conducted under Site Plans that are consistent with the strategies identified to conserve range resources. This information will be collated and reported out by the Licensee Team annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, range resources were identified and conserved through Site Plans, but they were never formally tracked, monitored and reported after harvest.

b) Implementation of SFMP: Range resources will continue to be identified and managed through Site Plans. Post harvest surveys will determine conformance with Site Plan strategies and incidents of non-conformance will be recorded in an incident tracking database. The percentage of blocks where range resources were conserved through Site Plans and the percent of

forest operations consistent with these conservation strategies will be tracked, monitored and reported out annually.

Forecasting and probable trends of measures

These measures are not easy to quantifiably forecast over a defined time frame as they are operational in nature. However, it is important to identify what the accepted targets mean to SFM. Conservation of range resources for those areas that have identified range resources primarily influences economic values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for measures such as these. As these measures currently have targets set at 100%, one other scenario for each should be identified:

- a) What if only 50% of Site Plans conserved identified range resources?
- b) What if only 50 % consistency occurred between forest management operations and strategies identified in the Site Plan to conserve resources?

Each of these "what if scenarios" would have similar impacts to SFM within the Vanderhoof DFA. Identifying only 50% of range resources and implementing only 50% of strategies to protect these resources could lead to negative economic impacts and failure to fully utilize the forest resource. Range use and forestry are examples of multiple resource use on the same land base, which ultimately increases the economic returns of the DFA. Loss of range opportunities would reduce the land base to a single use and would limit opportunities for integrated resource management. By identifying and conserving only 50% of range resources, grazing opportunities could also be reduced, thereby causing negative economic impacts to range licence holders within the DFA. Finally, if only 50% of range resources were identified and conserved, forest practices could potentially remove range barriers, which could in turn result in a significant cost increase for cattle management on range land.

The above "what if scenario" helps to identify some of the potential future impacts of not achieving the stated targets for these measures. Therefore, the Licensee Team will continue to ensure that 100% of all harvested areas conserve range resources and ensure related strategies are implemented on the ground. Licensee Team members will continue to conduct pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in the Site Plan are met. These initial, in between and final checks are part of each Licensee Team member's EMS/SOP and the future trend of this measure will remain at the target of 100% if all processes and protocols are followed.

Measure performances and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. In cooperation with range tenure holder and the MOF, the Licensee Team will explore the mitigative options available when harvest operations remove natural range barriers.

4.44 Conservation of Riparian Values

Statement of Measure	Management Objective
5-1.9 The percent of Site Plans conserving riparian values for those areas that have identified riparian values.	Annually, sustain 100% (0% variance) of the Site Plans that conserve riparian values when they are identified in the plan.
5-1.10 The percent of forest management operations consistent with the conservation of riparian values identified in the Site Plan.	Annually, sustain 100% (-5% variance) consistency between forest management operations and the strategies identified in the Site Plan to conserve riparian values.

These measures address the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber forest resources does not decline over time.

These measures also address the following CCFM SFM Criteria and CSA SFM Elements:

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|---|
| <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.1 – Timber and Non-timber Benefits <p>Criterion 6 – Accepting Society's Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.1 – Aboriginal and Treaty Rights |
|---|

What are these measures?

The protection and maintenance of riparian values gives assurance that these values will be conserved for future generations. As stated in this plan, the term riparian is defined as an area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of upland areas (refer to glossary in Appendix II). Riparian habitat is also defined in this plan as vegetation growing close to a watercourse, lake, swamp or spring that is generally critical for wildlife cover, fish food organisms, stream nutrients and large organic debris, and for stream bank stability. As identified within these two definitions, riparian values can be important to other ecological values such as vegetation, water quality and wildlife. The first measure in this section ensures that all Site Plans that have identified riparian values in the area of the plan also have identified strategies within that Site Plan to ensure the values are conserved. The second measure is designed to ensure that the Site Plans with identified strategies to conserve riparian values actually have those strategies implemented on the ground. Maintenance of riparian values is an important aspect to sustainable forest management because this measure contributes to these other values and also impacts the ecological, economic and social aspects of other important measures within the SFMP. These measures will help to ensure that various riparian values are conserved for future generations.

Current practices and state of measures

Riparian values are generally identified through the planning process and then verified on the ground during field exercises. During preparation of a Forest Development Plan, riparian values are identified on a map and if harvesting operations are planned for a specific area of land that contains potential riparian values, information will be further identified in a Site Plan.

An analysis of previous practices shows that 100% of all Site Plans that identify riparian values also have company developed strategies in place to conserve those values. Conservation strategies are implemented at the site level during harvesting operations so that all identified riparian values will be in place for future generations. If a non-conformance with the Site Plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so that issues can be tracked and mitigated as required.

Once a strategy to conserve is included within a Site Plan document, there is a legal obligation for the licensee to implement and adhere to the strategy. Harvest and silviculture inspections ensure that strategies are implemented as stated in the Site Plan document. Currently, 99% of forest operations within the DFA are consistent with completed Site Plans.

How are targets established?

Targets for these measures are established at 100% because the identification and conservation of riparian values is a socially and ecologically important component of forest management.

How will these measures be implemented, monitored and reported?

The data that is required to monitor the first measure is a summary of the number of Licensee Team Site Plans that identify riparian values, and a summary of the number of Licensee Team Site Plans that prescribe conservation strategies for these features. This information will be collated and reported out by the Licensee Team annually.

Data required to monitor the second measure includes a summary of the number of forestry management operations conducted under Site Plans that are consistent with the strategies identified to conserve riparian values. This information will be collated and reported out by the Licensee Team annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, riparian values were identified and conserved through Site Plans, but they were never formally tracked, monitored and reported after harvest.

b) Implementation of SFMP: Riparian values will continue to be assessed through riparian assessments as part of the Site Plan. Post harvest surveys will determine conformance with Site Plan strategies and incidents of non-conformance will be recorded in an incident tracking database. The percentage of blocks where riparian values were conserved through Site Plans and the percent of forest operations consistent with these conservation strategies will be tracked, monitored and reported out annually.

Forecasting and probable trends of measures

These measures are not easy to quantifiably forecast over a defined time frame as they are operational in nature. However, it is important to identify what the accepted targets mean to SFM. Conservation of riparian values influences ecological, economic and social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for measures such as these. As these measures currently have targets set at 100%, one other scenario for each should be identified:

- a) What if only 50% of Site Plans conserved identified riparian values?
- b) What if only 50 % consistency occurred between forest management operations and strategies identified in the Site Plan to conserve riparian values?

Each of these "what if scenarios" would have similar impacts to SFM within the Vanderhoof DFA. Identifying only 50% of riparian values and implementing only 50% of strategies to protect these values could lead to significant ecological, economic and social impacts. In an ecological sense, aquatic habitat, biological richness, water quality and species diversity could potentially all be negatively influenced by identifying only 50% of riparian values and implementing only 50% of strategies to protect these values. As a result, economic values could also decrease as healthy ecosystems support sustainable economic values. Social values could also decrease in response to the negative influence on ecological and economic values. If riparian habitat is decreased, wildlife populations could also potentially decrease, thereby reducing recreational hunting values.

The above "what if scenario" helps to identify some of the potential future impacts of not achieving the stated targets for this measure. Therefore, the Licensee Team will continue to ensure that 100% of all harvested areas conserve riparian values that have been identified and outlined in the Site Plan, and ensure related strategies are implemented on the ground. Licensee Team members will continue to conduct pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in the Site Plan are met. These initial, in between and final checks are part of each Licensee Team member's EMS/SOP and the future trend of this measure will remain at the target of 100% if all processes and protocols are followed.

Measure performances and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team has identified an opportunity for continual improvement through the assessment of the effectiveness of this target and its contribution to ecological and social values within the DFA.

4.45 Visual Quality Objectives and Conservation of Scenic Areas

Statement of Measure	Management Objective
5-1.11, 9-2.1 The percent of Site Plans within a scenic area that meet Visual Quality Objectives.	Annually, sustain 100% (0% variance) of the Site Plans that are within a scenic area and meet Visual Quality Objectives.
5-1.12, 9-2.2 The percent of forest management operations consistent with the conservation of Visual Quality Objectives identified in the Site Plan.	Annually, sustain 100% (-5% variance) consistency between forest management operations and the strategies identified in the Site Plan to conserve Visual Quality Objectives.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** The flow of marketed non-timber economic benefits from forests is sustained.
- **Local indicator:** The amount and quality of marketed non-timber forest resources does not decline over time.
- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain the visual quality of the managed landscape.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.1 – Timber and Non-timber Benefits <p>Criterion 6 – Accepting Society's Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.1 – Aboriginal and Treaty Rights |
|---|

What is this measure?

The protection and maintenance of visual quality in scenic areas gives assurance that these values will be available to future generations. As stated in this plan, a Visual Quality Objective (VQO) is a resource management objective established by the district manager or contained in a higher level plan that reflects the desired level of visual quality based on the physical characteristics and social concern for the area. The five categories of VQOs commonly used are:

- 1) Preservation – No visible timber harvesting activity.
- 2) Retention – Timber harvesting activities are not visually evident.
- 3) Partial Retention – Activities are visual, but remain subordinate.
- 4) Modification – Activities are visually dominant, but have characteristics that appear natural.
- 5) Maximum Modification – Activities are dominant and out of scale, but appear natural in the background.

The first measure ensures that all Site Plans that have identified VQOs in the area of the plan also have identified strategies in the Site Plan to ensure the visual quality of the landscape is conserved. The second measure is designed to ensure that those Site Plans with identified strategies to conserve visual quality have those strategies implemented on the ground.

Maintenance of visual quality in scenic areas is an important aspect to sustainable forest management because this measure contributes to overall landscape condition and social acceptance of industrial forestry. These measures together will help to ensure that visual quality is conserved for future generations.

Current practices and state of measure

Visually sensitive areas are defined in this SFMP as viewsheds that have been identified through a previous planning process. During Forest Development Plan production, scenic areas are identified on a map and if harvesting operations are planned for a specific area of land that contains scenic areas VQO information will be further identified in a Site Plan. Visual Impact Assessments help determine block shape, location and internal retention options. At the site level, strategies are included in the Site Plan to minimize visual impacts.

In response to the first measure, an analysis of previous practices shows that 100% of all Site Plans that identify scenic areas or visually sensitive areas also have strategies in place to conserve these resources. Conservation strategies are implemented at the site level during harvesting operations so all identified scenic areas and visual landscapes will be in place for future generations. If a non-conformance with the Site Plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so that issues can be tracked and mitigated as required.

With regards to the second measure, baseline data demonstrates that 100% of strategies that were prescribed through Site Plans were implemented on the ground. Harvest and silviculture inspections ensure that strategies are implemented as stated in the Site Plan document.

How are targets established?

Targets for these measures are established at 100% because the identification and conservation of visual quality is important to various stakeholders within the DFA.

How will this measure be implemented, monitored and reported?

The data that is required to monitor the first measure is a summary of the number of Licensee Team Site Plans that identify scenic areas or visually sensitive areas, and a summary of the number of Licensee Team Site Plans that prescribe VQOs and conservation strategies for these areas. This information will be collated and reported out by the Licensee Team annually.

The data that is required to monitor the second measure includes a summary of the number of forestry management operations conducted under Site Plans that are consistent with the strategies identified to conserve visual quality. This information will be collated and reported out by the Licensee Team annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, visual quality was identified and addressed through a Visual Quality Assessment as part of a Site Plan, but it was never formally tracked, monitored and reported after harvest.

b) Implementation of SFMP: Visual quality will continue to be assessed through Visual Impact Assessments (VIAs) as part of the Site Plan. Post harvest surveys will determine conformance

with Site Plan strategies and incidents of non-conformance will be recorded in an incident tracking database. The percentage of blocks where visual quality was conserved through Site Plans and the percent of forest operations consistent with these conservation strategies will be tracked, monitored and reported out annually.

Forecasting and probable trends of measure

These measures are not easy to quantifiably forecast over a defined time frame as they are operational in nature. However, it is important to identify what the accepted targets mean to SFM. Conservation of visual quality primarily influences social and economic values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for measures such as these. As these measures currently have targets set at 100%, one other scenario for each should be identified:

- a) What if only 50% of Site Plans conserved identified scenic areas through VQOs?
- b) What if only 50 % consistency occurred between forest management operations and strategies identified in the Site Plan to conserve scenic areas through VQOs?

Each of these "what if scenarios" would have similar impacts to SFM within the Vanderhoof DFA. Identifying only 50% of scenic area and resultant VQOs and implementing only 50% of strategies to protect these areas could lead to social and economic impacts. Although the overall timber supply would likely increase if only 50% of scenic areas and VQOs were observed, it would be at the cost of other economic and social values within the DFA. Visual quality helps businesses that cater to various forms of recreation including lodges, guiding and hunting, fishing and backcountry tourists. By not conserving all identified visual values, these businesses could potentially be at risk. Social values attributed to visual quality could also decrease if only 50% of scenic values are identified and only 50% of strategies to protect visual quality are implemented.

The above "what if scenario" helps to identify some of the potential future impacts of not achieving the stated targets for this measure. Therefore, the Licensee Team will continue to ensure that 100% of all harvested areas conserve scenic areas and ensure related strategies are implemented on the ground. Licensee Team members will continue to conduct pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in the Site Plan are met. These initial, in between and final checks are part of each Licensee Team member's EMS/SOP and the future trend of this measure will remain at the target of 100% if all processes and protocols are followed.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team realizes that the high level of mortality of pine forests in scenic areas will impact the visual quality of these viewscapes. Opportunities for rehabilitation of visual landscapes affected by the mountain pine beetle are an area of continual improvement in the DFA.

4.46 Local Opportunity to Quote on Tendered Contracts within the DFA

Statement of Measure	Management Objective
6-1.1 The percent of businesses within the DFA given an opportunity to quote on forest management tendered contracts.	Annually, sustain 100% of businesses within the DFA (-5% variance) that are given an opportunity to quote on forest management tendered contracts.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** Forest management contributes to a diversified local economy.
- **Local indicator:** Employment and income sources and their contribution to the local economy continue to be diversified.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.2 – Communities and Sustainability • Element 5.3 – Fair Distribution of Benefits and Costs |
|---|

What is this measure?

Woodlands operations of all Licensee Team members purchase a wide variety of products and services in order to produce timber and to manage forestry activities. This measure involves an analysis of the opportunities that businesses within the DFA are given to tender on forest management contracts through a competitive bid process. This process provides a larger opportunity for the DFA private sector to secure work and provides direct access to both timber and non-timber benefits.

This measure indirectly looks at the diversity of local forest employment opportunities associated with forest industry activities. It works in conjunction with the measure described in Section 4.53, Local Opportunities for Non-tendered Services within the DFA. For the purpose of this SFMP, the term local is defined as those residences or businesses that have mailing addresses within the DFA, or known established businesses located in the DFA.

Current practices and state of measure

For the period April 1, 2003 to March 31, 2004, 100% of all contractors in the DFA were given an opportunity to quote on tendered processes. Opportunity is dependent on the source of advertising for the contract. If contracts are advertised in a local public forum such as a newspaper, then it is assumed that all available contractors were given the opportunity to bid on that specific contract. If contracts are identified through a select tender list, and all eligible contractors are contacted, it is also assumed that an opportunity was given to all contractors.

How are targets established?

The target for this measure was established at 100% in order to promote the health and stability of the local economy. Within the DFA, several contractors are available to complete all phases of forest management contracts. The Licensee Team will strive to ensure that all tendered contracts

within the DFA will be offered to the available local businesses in order to promote the local economy.

How will this measure be implemented, monitored and reported?

All woodland's contracts that are tendered will be tracked annually. Each Licensee Team member will provide the percent of tendered contracts for inclusion in the annual report. Although this measure will not directly identify local forest employment opportunities attributable to forest management activities, it does provide a certain level of assurance for the sustainability of the local economy, which ultimately leads to future employment opportunities.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, opportunities to quote on tendered contracts were available, but they were never formally tracked, monitored and reported out.

b) Implementation of SFMP: Opportunities to quote on tendered contracts will continue to be available and these opportunities will be tracked and reported out annually by the Licensee Team to ensure targets are met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is related to operational practices. However, it is important to identify what the accepted target means to SFM. The percent of businesses within the DFA that are given an opportunity to quote on forest management tendered contracts directly affects economic values within the DFA and indirectly affects social values. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at 100%, one other scenario should be identified:

a) What if only 50% of businesses within the DFA were given the opportunity to quote on forest management tendered contracts?

If only 50% of businesses within the DFA were given the opportunity to quote on forest management tendered contracts, economic values would likely decrease. Fewer opportunities for local employment would be available and the overall local economy could potentially decline. This would in turn affect social values such as community stability and certain quality of life aspects.

It is realized that the number of available contracts for tender and the local economy have a direct relationship. In order to sustain a positive balance of values, the Licensee Team is committed to achieving the target identified for this measure.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will explore the effectiveness of this measure in determining whether the employment and income sources and their contribution to the local economy continue to be diversified.

4.47 Local Opportunities for Non-tendered Services within the DFA

Statement of Measure	Management Objective
6-1.2 The number of opportunities given to businesses within the DFA to provide non-tendered services to forest management activities.	Annually, sustain ≥ 40 opportunities within the DFA to provide non-tendered services to forest management activities (-4 variance).

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** Forest management contributes to a diversified local economy.
- **Local indicator:** Employment and income sources and their contribution to the local economy continue to be diversified.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society
• Element 5.2 – Communities and Sustainability • Element 5.3 – Fair Distribution of Benefits and Costs

What is this measure?

As previously mentioned, woodlands operations of the Licensee Team mills purchase a wide variety of products and services in order to produce timber and to manage forestry activities. This measure identifies the number of opportunities given to businesses within the DFA to provide non-tendered services to forest management activities. This measure is required along with the measure identified in Section 4.52 because some goods and services required in forest management are not put up for tender. Instead they are directly purchased or awarded. Like the previous measure, this measure identifies opportunities for the local private sector to secure work and opportunities for direct access to both timber and non-timber benefits. This measure also indirectly looks at the diversity of the local forest employment opportunities associated with forest industry activities. Again, for the purposes of this SFMP, local is defined as those residences or businesses that have mailing addresses within the DFA.

Current practices and state of indicator

The following table outlines the number of opportunities to provide non-tendered services by business type in the DFA.

Table 27. Opportunities to Provide Non-tendered Services in the DFA

Business Type	Number of Opportunities For Businesses in the DFA
Logging and Hauling	20
Road Construction and Maintenance	8
Silviculture	10
Planning and Administration	15
TOTAL	53

As indicated in Table 27, 53 opportunities to provide non-tendered services were given during the period April 1, 2003 to March 31, 2004.

How are targets established?

The target for this measure was established at ≥ 40 in order to promote the health and stability of the local economy. Within the DFA, several contractors are available to complete all phases of forest management contracts. The Licensee Team will strive to ensure that all non-tendered contracts within the DFA will be offered to the available local businesses, when possible, in order to promote the local economy.

How will this measure be implemented, monitored and reported?

The Licensee Team members identified forestry activities that are considered as non-tendered forest management activities and these activities will be tracked annually. Each Licensee Team member will provide a summary of this information to include in the SFMP annual report. Although this measure will not directly identify local forest employment opportunities attributable to forest management activities, it does provide a certain level of assurance for the sustainability of the local economy, which ultimately leads to future employment opportunities.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, opportunities for non-tendered services were available, but they were never formally tracked, monitored and reported out.

b) Implementation of SFMP: Opportunities for non-tendered services will continue to be available and these opportunities will be tracked and reported out annually by the Licensee Team to ensure targets are met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is related to operational practices. However, it is important to identify what the accepted target means to SFM. Like the previous measure, the number of opportunities given to businesses within the DFA to provide non-tendered services to forest management activities directly affects economic values within the DFA and indirectly affects social values. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to 40, one other scenario should be identified:

- a) What if no opportunities were given to businesses within the DFA to provide non-tendered services to forest management activities?

If no opportunities were given to businesses within the DFA to provide non-tendered services to forest management activities, economic values and benefits would decrease. Similarly to the previous measure, fewer opportunities for local employment would be available and the overall local economy would decline. This in turn would affect social values such as community stability and quality of life. With a reduced economic benefit the communities within the DFA would not be able to sustain their current economic status and overall negative effects to the public would occur. In order to sustain a positive balance of values, the Licensee Team is committed to achieving the target identified for this measure.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will explore the effectiveness of this measure in determining whether the employment and income sources and their contribution to the local economy continue to be diversified.

4.48 Local Business Relationships and Available Opportunities

Statement of Measure	Management Objective
6-1.3 Annually, the number of business relationships and opportunities made available and taken up.	Sustain ≥ 100 business relationships or opportunities (-10 variance) annually within the DFA.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** Forest management contributes to a diversified economy.
- **Local indicator:** Employment and income sources and their contribution to the local economy continue to be diversified.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.2 – Communities and Sustainability • Element 5.3 – Fair Distribution of Benefits and Costs

What is this measure?

Providing business relationships, opportunities and cooperative working arrangements with local residents of the DFA to provide mutual social, cultural and economic benefits is an important component to the success of a SFMP. The majority of the Licensee Team's suppliers, contractors and employees are retained from communities within the DFA and northern British Columbia. This measure monitors the number of business relationships and opportunities that the Licensee Team's woodlands operations are able to maintain over time with local people and businesses within the DFA.

A business relationship, in the context of this measure, is defined as a financial arrangement between a local business, or a person from a local community and a member of the Licensee Team. It can also be a financial arrangement between a local resident or business and a third party working on a project that is financially sponsored by a member of the Licensee Team. Whereas, an opportunity, within the context of this measure, is defined as a reasonable chance to form a business relationship like those previously mentioned. It is important to note that a business relationship does not directly relate to the number of contracts administered, as one particular business relationship may be facilitated through a number of contracts covering a variety of projects.

Current practices and state of measure

There are currently 155 business relationships between the Licensee Team woodlands operations and people from local businesses or communities. Although the details of these relationships are maintained in confidence, they range in monetary value and variety of project type. Current business relationships include large timber harvesting and development contracts, silviculture contracts of all types and sizes, forest management partnerships, third party employment arrangements, and short-term daily or weekly hires. Table 28 summarizes the business relationships or opportunities currently operating within the DFA.

Table 28. Business Relationships or Opportunities made Available in the DFA

Type of Business or Opportunity	Number of Business Relationships	Number of Business Opportunities	Totals
Forestry Management	24	18	42
Silviculture	22	10	32
Harvesting/ Road Construction	53	28	81
Total			155

How are targets established?

The target for this measure is established from a review of the current business relationships or opportunities in place and reasonable expectations for growth or fluctuations from year to year. Over the long term, the Licensee Team expects to continue to enhance the number and the diversity of business relationships or opportunities that are formed with local residents or businesses.

How will this measure be implemented, monitored and reported?

To monitor and report on this measure the Licensee Team will tally the number of business relationships and opportunities annually. A summary of this information will be provided in the SFMP annual report.

Management Modification and Link to Operational Plans:

- a) **Status Pre-SFMP:** Prior to the development of this SFMP, local business relationships and opportunities were available but they were never formally tracked, monitored and reported out.
- b) **Implementation of SFMP:** Local business relationships and opportunities will be tracked by each Licensee Team member and reported out on an annual basis to ensure targets are being met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is related to operational practices. However, it is important to identify what the accepted target means to SFM. The number of business relationships and opportunities made available and taken up directly affects economic values within the DFA and indirectly affects social values. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to 12, one other scenario should be identified:

a) What if no business relationships and opportunities were made available and taken up?

If there were no business relationships and opportunities made available and taken up within the DFA, two important values would be at risk. The first, and most important of these would be a reduction in the overall economy of the Vanderhoof DFA and surrounding areas. Utilizing services from outside the local area reduces the overall local economic benefits derived from forest management activities. Business relationships and opportunities that can be formed with local residents and businesses will keep the economic benefits derived from the forest industry at a local level.

The second risk involved with having no business relationships and opportunities available and taken up within the DFA could be the potential lack of localized knowledge and experience that would otherwise not be realized. Utilizing local knowledge and experience through potential business opportunities mutually benefits communities and the forest industry, and in turn also benefits the general public.

Due to the significant impact this measure could have on the local economy, the Licensee Team is committed to achieving ≥ 100 business relationships and opportunities within the DFA, as long as it is economically feasible.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team realizes that not all business opportunities made available and taken up are of equal value. The Licensee Team will explore a methodology to realize the value of various business opportunities made available.

4.49 Research and Development Projects or Partnerships within the DFA

Statement of Measure	Management Objective
6-1.4 The number of research and development projects and/or partnerships completed within the DFA.	Annually, sustain ≥ 3 research and development opportunities (-1 variance) within the DFA.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** Forest management contributes to a diversified local economy.
- **Local indicator:** Employment and income sources and their contribution to the local economy continue to be diversified.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 1 – Conservation of Biological Diversity • Element 1.1 – Ecosystem Diversity Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits
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What is this measure?

SFM system requirements are based on adaptive management and continual improvement, which can both be guided through specific results of research and development projects or partnerships conducted within the DFA. Research and development initiatives also provide direct economic benefits to the communities within the DFA such as local employment opportunities and local purchasing of goods and services. Research and development projects and other DFA partnerships can also potentially provide future ecological, economic and social benefits through the development of advanced technology.

Current practices and state of measure

The current status of research and development projects or partnerships that have occurred in the DFA between April 1st, 2003 and March 31st, 2004 are summarized in Table 29.

Table 29. Research and Development Projects and/or Partnerships in the DFA

Biodiversity Projects	Silviculture Projects	Forest Product Research and Development	Other	Total Number of Projects/Partnerships
1	1	1	3	6

Research and development initiatives in the Vanderhoof DFA are launched for various reasons and through various means of funding. The vicinity of the University of Northern British Columbia to the Vanderhoof DFA implies a greater opportunity for local research projects to take place. The research forest funded by the University is located north of the DFA in the Fort St. James Forest District. Many research projects within the DFA have also been initiated and funded through the Vanderhoof IFPA. One final venue members of the Licensee Team may take in order to fund research and development projects and/or partnerships is through FIA funds if the requirements of the FIA are met. The current mountain pine beetle epidemic in the DFA is a good opportunity for research and development initiatives. Projects may focus on assisting local businesses in adapting to the outcome of the epidemic and in the pursuit of new and innovative methods of utilizing the forest resource as a result of beetle infestations.

How are targets established?

The target was established from a review of current and past research and development projects conducted within the DFA and any reasonable expectations for growth or year to year fluctuations. Over the long-term, the Licensee Team expects to continue to enhance the number and the diversity of research and development projects and/or partnerships.

How will this measure be implemented, monitored and reported?

Monitoring of this measure will occur on an annual basis. Licensee Team members will track and report individual projects and/or partnerships and these will be tallied together to ensure the DFA target is being met for the collaborative Licensee Team.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, research and development projects and partnerships were present within the DFA but they were not formally tracked, monitored or reported.

b) Implementation of SFMP: Research and development projects will be tracked by each Licensee Team member and then summarized annually for reporting to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is related to operational practices. However, it is important to identify what the accepted target means to SFM. The number of research and development projects and/or partnerships completed within the DFA directly affects ecological, economic and social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to three, one other scenario should be identified:

- a) What if no research and development projects and/or partnerships were completed within the DFA?

If there were no research and development projects and/or partnerships were completed within the DFA, important values of SFM would be at risk. The first, and most important of these would be the loss or reduction in the research necessary to support changes in practices to improve forest management as a part of continual improvement. Ecologically, this would lead to the potential loss of understanding of biological richness within the DFA and how to sustain it. From an economic viewpoint, a loss of research might impact the long-term timber supply. Without credible research, increases to the available timber supply would not be substantiated in the context of SFM. A result of these potential impacts could potentially lead to a decrease in overall social values across the DFA.

Due to the significant impact this measure could have on important values of SFM, the Licensee Team is committed to achieving ≥ 3 research and development opportunities, as long as it is economically feasible.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will continue to improve working relationships with local Universities and other research groups, i.e. FORREX, CFS.

4.50 The Percentage of Direct Employment from Forestry in the DFA

Statement of Measure	Management Objective
6-1.6 The percentage of direct employment and number of person years derived from the forest industry in comparison to other sectors within the DFA.	A percentage of direct employment from forestry over the census period will be determined by December 2005.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** Forest management contributes to a diversified local economy.
- **Local indicator:** Employment and income sources and their contribution to the local economy continue to be diversified.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.2 – Communities and Sustainability |
|--|

What is this measure?

The percent of direct employment and the number of person years are direct measures of the flow of forest industry benefits to the local communities within the DFA. This measure demonstrates that the forest resource supplies a direct source of income and economic stability for forestry employees in the DFA. Also included in this measure is a comparative aspect in which the forest industry is measured relative to other industry sectors in the DFA such as agriculture, mining and tourism. This comparison will allow for benchmarking of economic benefits that are derived from the forest resource as compared to other resource-based industries.

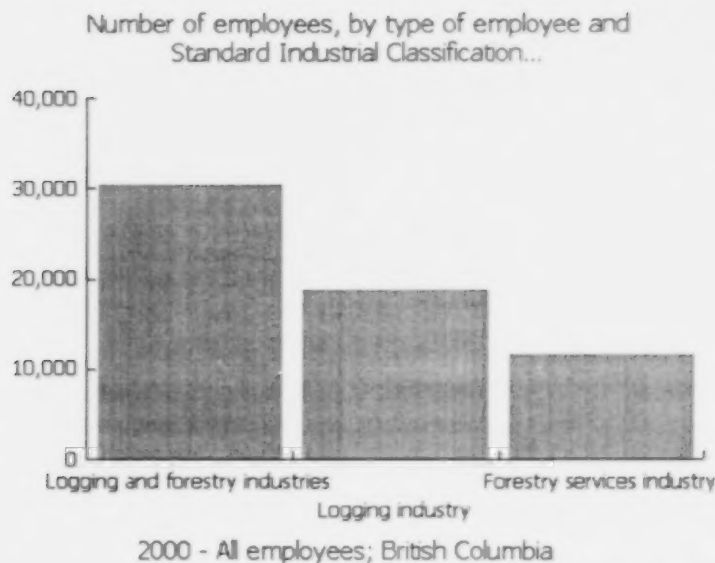
Current practices and state of measure

The current state of direct employment and the number of person years have proven to be difficult values to determine for the Vanderhoof DFA. Given the current lack of DFA specific data relating to this measure, it can not be quantifiably measured at this time. Methods to achieve the required base line data or opportunities to adjust this measure will be addressed in the continual improvement section and a target value will be identified by December 2005. In lieu of more detailed information, Figure 15 (Statistics Canada 2000) depicts the level of forestry employment in 2000 in the province of British Columbia.

How are targets established?

The target for this measure was originally to be based on census data for the Vanderhoof DFA. However, this data is not currently accessible, therefore the target may need to be reviewed and re-adjusted based on information that is available for benchmarking. A target for this measure will be defined by December 2005.

Figure 15. Forestry Employment in British Columbia in 2000



How will this measure be implemented, monitored and reported?

The monitoring and reporting procedures will greatly depend on the data source used. Therefore, this section should be addressed when the data set has been chosen.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, direct employment from the forest industry was not tracked, monitored or reported out.

b) Implementation of SFMP: Once a target is defined by December 2005, the percentage of direct employment from forestry in the DFA will be tracked, monitored and reported through government census data. Summarized data for the DFA will be reported annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

Forecasting of this measure is difficult without an established target. However, a general "what if scenario" can be used to help identify the value of this measure to SFM within the DFA. For adequate analysis, two potential scenarios are identified:

- a) What if there was no direct employment derived from the forest industry in comparison to other sectors within the DFA?
- b) What if three times the target value of direct employment was derived from the forest industry in comparison to other sectors within the DFA?

If there were no direct employment derived from the forest industry in comparison to other sectors within the DFA the overall economy would decrease, and have negative impact on community stability. As the Vanderhoof DFA is a resource based economy, a reduction in employment derived from forestry would affect the general economy and decrease the overall quality of life within and surrounding the DFA.

If three times the target value of direct employment were derived from the forest industry the overall economy would increase in the short term. However in the long term the overall economy would be more dependent on fluctuations in the forest industry and lack the reliance to overcome a shortfall in timber supply or a downturn in market conditions.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team view this measure and the resulting target as an ongoing source of continual improvement. Methods to achieve the required base line data or opportunities to adjust this measure will be addressed and reviewed with the PAG.

4.51 Number of Different Forest Products Produced within the DFA

Statement of Measure	Management Objective
6-1.7, 9-5.2 The number of different forest products produced within the DFA.	Annually, sustain ≥ 9 different forest products (-2 variance) produced within the DFA.

This measure addresses the following SFM framework parameters:

- **Value:** Economic
- **Criterion:** Forest management contributes to a diversified local economy.
- **Local indicator:** Employment and income sources and their contribution to the local economy continue to be diversified.
- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain support for local organizations within the DFA.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits • Element 5.2 – Communities and Sustainability
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What is this measure?

This measure provides information regarding the number of forest products that are produced within the DFA ranging from dimensional lumber to a variety of value added products. This measure also helps to show how forest management activities can contribute to a diversified local economy based on the range of products produced at the local level. Value added products are an important part of a local economy as production utilizes a raw resource and produces a secondary

product using local employment and, quite often, local goods and services. However, the ability of value added manufacturers to sustain operation is often dependent on the availability of raw material from the dimensional lumber mills.

Forest management's contribution to multiple benefits to society is evident through this measure, as well as an indication of the level of diversification in the local economy. Licensee Team members provide dimensional lumber products and help to supply value-added manufacturers with raw materials for production. These provisions help to maintain stability and sustainability of socio-economic factors within the DFA. By ensuring a large portion of the volume of timber harvested in the DFA is processed in local facilities, the local economy will remain stable and products of local area mills will continue to be available.

Current practices and state of measure

Each Licensee Team member currently produces a variety of forest products with different grades and sizes of dimensional lumber being the primary products. Licensee Team members also produce specialty wood products such as Japanese select lumber, Machine Stress Rated lumber, bed frame stock, and a variety of special order lumber products. Value added manufacturers in the DFA purchase dimensional lumber and certain by-products from the Licensee Team mills to produce products such as log homes, house logs, finger-jointed lumber, wood pellets and building timbers. A complete list of local DFA wood products is shown in the following table.

Table 30. Current Number of Forest Products Produced in the DFA

Year	Manufacturer	Products	Tally
2003	Canfor Vanderhoof	2x4, 2x6, 2x10 all dimensions, MSR	4
2003	L&M Lumber	2x3, 2x4, 2x6, 1x3, 1x4 studs, Japanese Premium, bed frames	7
2003	Specialty Mills (VSWP, Premium Pellet, Legacy Log Homes, Rocky Mt. Log Homes, etc.)	finger joints, wood pellets, house logs, log homes, custom cut timbers.	4
TOTAL			15

How are targets established?

The target is established from a review of current practices and any reasonable expectation for growth or for fluctuations from year to year. Over the long-term, the Licensee Team expects to produce the same number and diversity of forest products within the DFA. However the Licensee Team does not have direct control over the number of forest products produced by the value added industry, nor the markets enabling these products to be produce economically.

How will this measure be implemented, monitored and reported?

In order to track and evaluate information for this measure, Licensee Team members will report individual products produced at each mill. Licensee Team members will also be required to track and report out on products produced by affiliated value added mills in the DFA.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, a number of different forest products were produced in the DFA but this information was not tracked, monitored or reported out.

b) Implementation of SFMP: The Licensee Team will track and report the different products produced at their respective mills along with products produced at affiliated value added mills. This information will be summarized and reported annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is dependent on other variables such as markets, harvesting levels and availability of raw material. However, it is important to identify what the accepted target means to SFM. The number of different forest products produced within the DFA affects economic and social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to nine, one other scenario should be identified:

a) What if significantly less than nine different forest products were produced within the DFA?

If significantly less than nine different forest products were produced within the DFA diversity within the Vanderhoof area would decrease. Timber harvested from the DFA would not achieve full returns of revenue because utilization of harvested logs would likely decrease. Employment would also likely decrease within the DFA, which would in turn affect the quality of life in and around the Vanderhoof area. In light of the mountain pine beetle infestation, this measure is increasingly important. In the short-term, harvesting levels will increase to try and salvage as many timber values as possible before they are lost. Therefore, it will be important to achieve maximum utilization of this wood and maximize returns as much as possible.

Due to the significant impact this measure could potentially have on important values of SFM, the Licensee Team is committed to achieving ≥ 9 different forest products produced in the DFA.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will look at the effectiveness of this measure and its ability to promote and contribute to diversified local economy.

4.52 Number of Public Advisory Group Meetings per Year

Statement of Measure	Management Objective
7-1.1 The number of Public Advisory Group meetings per year.	Annually, sustain ≥ 2 PAG meetings (-1 variance) per year.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** Forest management planning adequately reflects the interest and issues raised by the public in the DFA through an effective public participation process.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development • Element 6.3 – Public Participation • Element 6.4 – Information for Decision Making

What is this measure?

The Vanderhoof PAG is made up of a diverse set of representatives that have various defined interests, values or specific uses of the forest resource within the DFA. The PAG provided valuable input on the initial development of values, indicators, measures and targets for this SFMP in order to strive toward SFM. PAG members helped to identify local issues and values attributed to the Vanderhoof DFA for forestry managers to consider during management and planning processes. The PAG will continue to provide guidance, input and evaluation throughout the SFMP process, including all aspects of implementation and continual improvement of the plan over time. This measure provides information regarding how often the Licensee Team will provide the opportunity for the PAG to meet on an annual basis.

Current practices and state of measure

Between November 2003 and July 2004, the PAG met 14 times to develop the various indicators, measures and targets specific to the Vanderhoof SFMP. Continual interaction with the PAG is considered extremely beneficial for efficient progression towards SFM. PAG participation with the SFMP will also help to demonstrate the achievement of public participation requirements, which will also help in achieving performance audit requirements. As a result, the Licensee Team members will continue to build a positive working relationship with the PAG by committing to keeping the PAG well informed of the SFMP process by holding at least two PAG meetings each year.

How are targets established?

The target for the Vanderhoof DFA PAG was established from a review of other similar PAG processes. Scheduled meetings twice a year will allow opportunities for the PAG to have input into the SFMP, input and comment regarding continual improvement of the plan and feedback regarding adaptive management processes that are developed over time. Requirements to convene the PAG will be dependent on the tasks that occur that may require the guidance, input and/or evaluation of PAG members. A minimum of two meetings per year is considered

necessary to keep the PAG informed and up to date on issues regarding SFM in the Vanderhoof DFA.

How will this measure be implemented, monitored and reported?

PAG meetings will be scheduled a minimum of two times throughout the year. During these meetings, minutes will be recorded indicating the date of the meeting and the members in attendance, along with the items discussed during the meeting. Meeting minutes will be tracked and filed to ensure that Licensee Team members are meeting target requirements.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, there were no Public Advisory Group meetings, so they were not tracked or monitored.

b) Implementation of SFMP: Public Advisory Group meetings will be scheduled as required throughout the year and will be documented, tracked and monitored to ensure the target is achieved. This information will be summarized and reported out annually. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is dependent on implementation and future improvement of this SFMP. However, it is important to identify what the accepted target means to SFM. The number of PAG meetings per year affects primarily the social values identified within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to two, one other scenario should be identified:

a) What if there were no future PAG meetings?

If there were no future PAG meetings for the Vanderhoof SFMP, social values of SFM could potentially be reduced. Without regular PAG meetings, public participation requirements would not be fulfilled. Without local public comment, this plan would potentially not be adequately localized to the Vanderhoof DFA. Sustainability of the forest resource would be more difficult to achieve as locally important values might be overlooked without sufficient public input. Another potential effect of having no PAG meetings would be a reduced public acceptance of the plan and potential skepticism of the overall intent. General understanding of SFM and resulting initiatives would also likely be reduced and future goals identified by the Licensee Team would be more difficult to achieve.

Due to the impact this measure could have on important social values of SFM, the Licensee Team is committed to achieving ≥ 2 PAG meetings per year.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will look for ways to maximize the effectiveness of future PAG meetings. One possible improvement may be to explore creating small working groups to work on specific projects and issues.

4.53 The Level of Satisfaction of the Public Advisory Group

Statement of Measure	Management Objective
7-1.2 Measure the level of satisfaction of the PAG members with the process annually.	Annually, sustain a satisfaction index level ≥ 4 (-0.5 variance).

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** Forest management planning adequately reflects the interest and issues raised by the public in the DFA through an effective public participation process.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development
• Element 6.3 – Public Participation
• Element 6.4 – Information for Decision Making

What is this measure?

The PAG is one of the key elements of public involvement in the SFM process. The Vanderhoof PAG provides guidance, input and evaluation during development of the SFMP and is also instrumental in maintaining links to current local values and forest resource uses within the DFA. Therefore, it is important that the Licensee Team have a positive and meaningful working relationship with the PAG, where the Licensee Team is able to respond to all issues and concerns the PAG may have during the process. This measure involves an annual survey to determine the level of satisfaction of the PAG, which provides the Licensee Team an analysis tool to gauge how well the public participation process is working.

At the local level, people who use or otherwise value the forest resources within the DFA should have insight and involvement into the SFM process. This is particularly applicable in British Columbia where the majority of the forest is publicly owned. The need for public involvement is fundamental and in order to gain the support of the public and develop effective working relationships with the PAG, the Licensee team needs to be responsive to the satisfaction level of the PAG. Both the PAG and the Licensee Team can recognize the benefits of a well-developed public process. The Licensee Team gains insight into local values and objectives and the PAG participants learn about the SFM process and the overall goals of sustainable development.

Current practices and state of measure

During the first 14 meetings, PAG participants completed two formal satisfaction surveys. These surveys consist of four general sections including comment on PAG meetings, the facilitators of the meetings, a rating of meeting logistics, and finally a section for suggestions and general comments (see Appendix XI). PAG member satisfaction feedback has also been solicited informally at each meeting held in the DFA. According to the feedback of both these processes, the perceived level of satisfaction is high, with an overall average ranking of 4.0, although there are definite areas for improvement. A figure summarizing the answers received from the two questionnaires that have already been distributed to the PAG participants is also included in

Appendix XI. More specific feedback will be requested from the PAG after this SFMP is implemented and The Licensee Team will begin to distribute satisfaction surveys to the PAG on an annual basis starting in 2005. Strategies to maintain or enhance PAG member satisfaction will be dependent on the results of these annual surveys.

How are targets established?

The satisfaction index is a numerical rating system composed of the following values:

- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = very good

The target for this measure is a satisfaction level of ≥ 4 . This value was determined by the PAG and the Licensee Team as being an accurate value to represent overall PAG satisfaction. Any issue listed on the questionnaire that receives a value less than 4 indicates the Licensee Team should re-visit the process and attempt to implement strategies to improve the identified areas.

How will this measure be implemented, monitored and reported?

As previously mentioned, the PAG satisfaction survey will be distributed annually to PAG participants. Licensee Team members will collate the results of these questionnaires in order to highlight the overall results. If the target satisfaction index level of ≥ 4 is not achieved, Licensee Team members will meet to discuss various strategies to improve the PAG process based on survey results. Annual assessment of the PAG process will allow PAG participants to express their concerns and will also allow the Licensee Team to adjust and continually improve the process if necessary.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, there was no Public Advisory Group and no satisfaction index to measure.

b) Implementation of SFMP: A satisfaction survey will be distributed annually to Public Advisory Group members to ensure proper functioning of the public process. The survey will be summarized and reported out on an annual basis as well. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is subjective in nature and depends on many aspects of the SFM process. However, it is important to identify what the accepted target means to SFM. The level of satisfaction of the PAG members with the SFMP process primarily affects the social values identified within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to four, one other scenario should be identified:

a) What if the PAG satisfaction index was less than four?

If the PAG satisfaction index was less than four, social values of SFM could potentially be reduced. As with the previous measure public participation requirements would not be fulfilled if the PAG was not satisfied with the process because members would have no incentive to continue participating. Without local public comment, this plan would potentially not be adequately localized to the Vanderhoof DFA. Sustainability of the forest resource would be more difficult to achieve as locally important values might be overlooked without sufficient public input. Another potential effect of the satisfaction of the PAG falling below the target could be a reduced public acceptance of the plan and, as with the previous measure, potential skepticism of the overall intent. General understanding of SFM and resulting initiatives would also likely be reduced and future goals identified by the Licensee Team would be more difficult to achieve.

Due to the impact this measure could have on important social values of SFM, the Licensee Team is committed to achieving a satisfaction index level of ≥ 4 with regards to the PAG and the SFM process. It is anticipated that Licensee Team members will continue to maintain a good working relationship with the PAG and promote a consensus based decision making process, which in turn will keep satisfaction levels high. Results of the initial surveys and subsequent annual surveys will also provide continual feedback so that the Licensee Team can strive to maintain or increase PAG satisfaction levels in the future.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will continue to improve on the effectiveness of the questionnaire to assess the level of PAG satisfaction with the SFM process. Once the Licensee Team determines the concerns and shortfalls, a documented change management process will be implemented to improve the PAG process.

4.54 Maintenance and Review of the PAG Terms of Reference

Statement of Measure	Management Objective
7-1.3 Maintain and review annually the SFM plan PAG TOR, to ensure a credible and transparent process.	The PAG TOR will be reviewed each year (0% variance) to ensure a credible and transparent process. This will be monitored annually.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** Forest management planning adequately reflects the interest and issues raised by the public in the DFA through an effective public participation process.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development • Element 6.3 – Public Participation
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What is this measure?

This measure indicates that a Terms of Reference document has been developed in consultation with the PAG, and that these Terms of Reference have been accepted for use in all future PAG meetings. The Terms of Reference document is an important part of the public participation component of this SFMP. SFM requires public participation and the PAG Terms of Reference ensure these requirements are met in a credible and transparent fashion. The Terms of Reference document will be reviewed annually unless consensus from the group suggests otherwise.

Because Canadian forests are primarily publicly owned, it is vital that a SFM initiative involves the public extensively in the forest management planning process. The Vanderhoof PAG represents a diverse range of interests specific to the DFA of this plan. Therefore, the PAG is necessary to ensure that sustainable forest management is achieved. Each member of the PAG must be able to have effective and fair interaction or communication with one another, as well as with members of the Licensee Team, to ensure all identified values receive adequate consideration. The Terms of Reference document is intended to provide the necessary framework and proper protocol to ensure effective input from PAG representatives.

Current practices and state of measure

The initial Terms of Reference document was developed by the PAG and accepted as part of the SFMP process on January 15, 2004. The PAG Terms of Reference will be reviewed annually to ensure it is up to date with the present day context of SFM. The Licensee Team will ensure that PAG members are given adequate notice as to when the Terms of Reference document will be reviewed. This review should be part of a scheduled PAG meeting so that all participants are aware of review timelines. The Licensee Team members will maintain the Terms of Reference document so that any revisions resulting from an annual review will be made and a new document will be distributed to PAG members.

How are targets established?

The target for this measure was identified from a review of other public participation processes and from consultation with the Vanderhoof PAG. Annual review of the PAG Terms of Reference will allow the document to remain timely and achieve its purpose within the PAG.

How will this measure be implemented, monitored and reported?

As the review of the PAG Terms of Reference is set to be a part of a scheduled PAG meeting, this will be evident in the PAG meeting minutes. Review of the PAG Terms of Reference and any identified changes to the document will be reported annually to PAG and Licensee Team members.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, there was no Public Advisory Group Terms of Reference.

b) Implementation of SFMP: The Public Advisory Group Terms of Reference will be reviewed at one of the scheduled meetings throughout the year to ensure the document is kept up to date and meaningful for the group. The review of the Terms of Reference will be documented tracked

and reported out to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. Annual review and maintenance of the SFMP PAG Terms of Reference to ensure a credible and transparent process primarily affects the social values identified within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at once per year, it is important to identify two potential scenarios:

- a) What if the PAG Terms of Reference document was never reviewed?
- b) What if the PAG Terms of Reference document was reviewed five times per year?

If the PAG Terms of Reference document were never reviewed, the PAG process would potentially cease to be credible and transparent. This could result in overall dissatisfaction with the PAG and reduced incentive to continue participating in the process. Without local public comment, this plan would potentially not be adequately localized to the Vanderhoof DFA as values change over time. Sustainability of the forest resource would then be more difficult to achieve as locally important values might be overlooked without sufficient public input. Another potential effect of never reviewing the PAG Terms of Reference could be a reduced public acceptance of the plan and, as with the previous measure, potential skepticism of the overall intent. General understanding of SFM and resulting initiatives would also likely be reduced and future goals identified by the Licensee Team would be more difficult to achieve.

If the PAG Terms of Reference document were reviewed five times per year, it would not be an efficient use of the public's time during scheduled PAG meetings. While it is important to maintain a credible and transparent process, spending an excessive amount of time reviewing the Terms of Reference would ultimately detract from other important aspects and contributions that PAG members might help make towards SFM in the Vanderhoof DFA.

From an analysis of the "what if scenarios", it is clear that a balance of values can be achieved with an annual review of the PAG terms of reference. As such, the Licensee Team is committed to maintaining and reviewing the PAG Terms of Reference on an annual basis to ensure a consensus-based public involvement process.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The PAG Terms of Reference must be able to evolve through continual improvement as the SFM process changes overtime.

4.55 Percent of Timely Responses to Written and Documented Concerns

Statement of Measure	Management Objective
7-1.4 The percent of timely responses to written and documented concerns categorized by value.	Annually, sustain 100% (-10% variance) of timely responses to all written and documented concerns.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** Forest management planning adequately reflects the interest and issues raised by the public in the DFA through an effective public participation process.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development

- Element 6.3 – Public Participation
- Element 6.4 – Information for Decision Making

What is this measure?

Members of the Licensee Team solicit feedback for all public plans and they also receive ongoing general feedback regarding practices and management of the DFA. Implementation of this SFMP will operate in the same fashion and Licensee Team members will respond to all written letters or other documented concerns. As previously mentioned, public involvement is an important aspect of SFM so it is necessary to provide meaningful and effective opportunities to incorporate public input into the SFMP and to respond to public concerns. Public values will change through time so it is important to be able to efficiently solicit public feedback, and where possible, incorporate this input through forest management techniques and practices.

Current practices and state of measure

Currently, Licensee Team members respond to written public concerns in the DFA that involve forest management or practices.

How are targets established?

Target information was applied to this measure based on a review of past performance from Licensee Team members. Public input is an important aspect of the SFM process. Therefore, it is paramount to ensure that written and documented concerns are dealt with in a timely and thorough fashion. With future reviews and annual reports for this plan the Licensee Team will have a better knowledge of how this target will apply to this measure. If the target is not met in the future, strategies will be developed to improve practices, or targets will be adjusted to better reflect practices in the DFA. The Licensee Team members will commit to responding to written public comments within 30 days of receipt.

How will this measure be implemented, monitored and reported?

Annually, a review of the comments received in response to public plans and the number of responses put forth by members of the Licensee Team will be analysed. This information will be recorded and reported out on an annual basis.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, timely responses to written and documented concerns were completed, but this information was not formally tracked, monitored and reported out.

b) Implementation of SFMP: Written and document concerns will be tracked and the required Licensee Team member will respond to each instance within thirty days of receipt. Responses to concerns from the public will also be tracked and monitored to ensure the target is achieved. This information will be reported out annually. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. The percent of timely responses to written and documented concerns directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of 100%, one other potential scenario should be developed:

a) What if there were only 50% of timely responses to all written and documented concerns?

If there were only 50% of timely responses to all written and documented concerns, adequate attention would not be made to valuable public input. Public input into the SFM process is required to adequately consider other resource values within the DFA. If only 50% of concerns were addressed, public participation into SFM would decrease and impacts to other resource values such as cultural heritage, non-timber forest resources and biological richness could potentially occur. If these other forest values are not fully realized, economic values could also potentially decrease. An example of this would be the reduced local input to non-timber forest values and an eventual decrease in economic returns from these values if they are not fully realized.

The above "what if scenario" analysis implies that a balance of values can be achieved through maintenance of full response to identified public concerns. Therefore, the Licensee Team will continue to provide response to written and documented concern received by the public within 30 days of receipt.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual improvement will involve linking this measure with the proactive planning measure (7-1.6). This will ensure that the Licensee Team is including adequate opportunity for public input.

4.56 The Level of Stakeholder Satisfaction with Forest Management

Statement of Measure	Management Objective
7-1.5, 8-1.3 Through an ongoing survey (at least annually), measure the level of residents and stakeholders and Aboriginal satisfaction to forest management (process and outcomes).	Annually, sustain a satisfaction index of ≥ 4 (-0.5 variance).

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** Forest management planning adequately reflects the interest and issues raised by the public in the DFA through an effective public participation process.
- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** Forest management recognizes and respects Aboriginal treaty rights.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits Criterion 6 – Accepting Society's Responsibility for Sustainable Development • Element 6.3 – Public Participation • Element 6.4 – Information for Decision Making
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What is this measure?

This measure was developed in order to provide information relating to the level of satisfaction of residents, stakeholders, and Aboriginal people with forest management activities conducted by the Licensee Team. Satisfaction levels will be determined through the use of an annual survey, which will be widely distributed to residents, stakeholders and Aboriginal people based on previous interactions with Licensee Team members regarding expressions of interest or value within the DFA.

The DFA currently provides numerous opportunities for individuals to use the forest resource for a variety of marketed and non-marketed benefits. In managing the DFA towards SFM principles, it is important to be able to effectively interact and respond to the needs of the primary users of the resource base. Throughout time the categories of uses and values within the DFA will change and it is equally important for members of the Licensee Team to be able to respond to these changes and encourage a diversity of user groups. Current and future needs and values of the various user groups of the DFA will need to be incorporated into SFM planning strategies.

Current practices and state of measure

There is currently no formal method to solicit information regarding the satisfaction of those individuals that interact with Licensee Team members. Previously, members of the public could state their concerns with forest management practices by submitting formal letters stating concerns based on public plans. While this is an adequate means of receiving public feedback, the development of a survey will solicit both positive and negative feedback from a much larger public group. This measure proposes a survey to gather information from users of the DFA regarding their satisfaction with forest management practices occurring in the DFA. This survey is the initial step toward deriving suitable targets for overall levels of satisfaction for the various user groups.

How are targets established?

Initial targets for this measure were set at a satisfaction index level of ≥ 4 . The satisfaction index is a numerical rating system composed of the following values:

- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = very good

The Licensee Team determined that an overall average score of 4 out of 5 would be an acceptable satisfaction level target. Depending on the results of the initial survey, strategies will be developed to maintain or enhance user satisfaction. Subsequent annual surveys will determine if these strategies are effective and whether the target should be adjusted in the future.

How will this measure be implemented, monitored and reported?

As no current survey exists, implementation of this measure will involve the development and distribution of a survey that will gauge the level of satisfaction of residents, stakeholders and Aboriginal people in the DFA to forest management activities. The Licensee Team will identify a list of individuals that have had past interactions concerning forest management activities within the DFA. These individuals will receive the initial confidential survey, which will then be collated and analysed for future improvement measures. The survey will be distributed on an ongoing basis with the results being tabulated annually. A review of the list of recipients will occur annually as well. It is anticipated that the initial survey will be completed and distributed in January 2005.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, the level of stakeholder satisfaction with forest management was never formally measured.

b) Implementation of SFMP: A satisfaction survey will be developed and distributed to stakeholders within the DFA. Results of the survey will be summarized and reported out annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends

This measure is not easy to quantifiably forecast over a defined time frame as it subjective in nature and depends on many aspects of the SFM process. However, it is important to identify what the accepted target means to SFM. The level of satisfaction of residents, stakeholders and Aboriginal people with the SFMP process primarily affects the social values identified within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to four, one other scenario should be identified:

- a) What if the resident, stakeholder and Aboriginal people's satisfaction index was less than four?

If the resident, stakeholder and Aboriginal people's satisfaction index was less than four, social values of SFM could potentially be reduced. Public participation requirements would not be fulfilled if local residents, stakeholders and Aboriginal people were not satisfied with the process because members would have no incentive to continue participating. Without local public comment, this plan would potentially not be adequately localized to the Vanderhoof DFA. Sustainability of the forest resource would be more difficult to achieve as locally important values might be overlooked without sufficient public input. Another potential effect of the satisfaction of residents, stakeholders and Aboriginal people falling below the target could be a reduced public acceptance of the plan and potential skepticism of the overall intent. General understanding of SFM and resulting initiatives would also likely be reduced and future goals identified by the Licensee Team would be more difficult to achieve.

Due to the impact this measure could have on important social values of SFM, the Licensee Team is committed to achieving a satisfaction index level of ≥ 4 with regards to residents, stakeholders and Aboriginal people, and the SFM process. It is anticipated that Licensee Team members will continue to maintain a good working relationship with local residents, stakeholders and Aboriginal people.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will continue to improve on the effectiveness of the questionnaire to assess the level of stakeholder, residents and Aboriginal satisfaction with the SFM process. Once the Licensee Team determines the concerns and shortfalls, a documented change management process will be implemented to improve the survey process.

4.57 Opportunities for Proactive Public Involvement in Planning Processes

Statement of Measure	Management Objective
7-1.6 The number and variety of effective opportunities given to the residents and stakeholders to express forestry related concerns and be proactively involved in planning processes (i.e. FSP, harvest and road schedules). Summarized annually.	Annually, sustain ≥ 24 (-4 variance) opportunities for residents and stakeholders to express forestry related concerns and be proactively involved in planning processes.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** Forest management planning adequately reflects the interest and issues raised by the public in the DFA through an effective public participation process.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development • Element 6.3 – Public Participation • Element 6.4 – Information for Decision Making

What is this measure?

This measure was designed to monitor the Licensee Team’s success at providing effective opportunities to residents and stakeholders to express concerns and be proactively involved in the planning process. Examples of how residents and stakeholders could become proactively involved in planning processes would be identification of areas of interest, definition of the nature of their interest in the land base, and any specific forestry activity that may impact their specific interests. This ensures that when forestry activities are planned, information is exchanged in an effective and timely manner, so as to resolve potential conflicts before they occur. This process will help to identify the public values, interests and uses of the forest that will be considered within the Licensee Team’s planning framework.

Current practices and state of measure

The Licensee Team currently solicits public and stakeholder input on all FDP and related amendments. A review of baseline data as noted in Table 31 reflects this current practice. More complete information on the current status of this measure will be recorded, as future summary information from tracking of this measure is completed.

Table 31. Effective Opportunities Given to the Public to Express Forestry Management Concerns

Description of Opportunity (Number of)	Number of Opportunities Annually
Open Houses	2
Individual Meetings	5
Letters	52
Newspaper Advertisements	25
Other	1
Total	85

How are targets established?

The current target is based on a general estimate of the number of opportunities given to residents and stakeholders based on information from members of the Licensee Team. Once baseline data is available and collected in 2005 and 2006, the target will be adjusted accordingly to better reflect the needs of the Vanderhoof DFA. Future planning processes will focus stakeholder input on a strategic level, as opposed to current stand level referrals. The Licensee Team expects the strategic input will be relevant to landscape level development activities incorporating stakeholder concerns. Incorporating this strategic/landscape level stakeholder input is expected to reduce the individual number of site specific referrals necessary. Thus until baseline data has been obtained from future proactive planning processes, the licensee team has chosen the current target.

How will this measure be implemented, monitored and reported?

The number of opportunities for residents and stakeholders to express forestry related concerns and be proactively involved in planning processes will be tracked by each individual Licensee Team member. Each Licensee Team member will be required to review and summarize this information annually for reporting purposes.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, opportunities for public involvement in the planning process were available, but were not formally tracked, monitored and reported out.

b) Implementation of SFMP: Opportunities for public involvement in the planning process will be tracked by each Licensee Team member. This information will be summarized and reported out annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. The number and variety of effective opportunities given to residents and stakeholders to express forestry related concerns and be proactively involved in the planning process directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of ≥ 24 , one other potential scenario should be developed:

- a) What if considerably less than 24 effective opportunities were given to residents and stakeholders to express forestry related concerns and be actively involved in the planning process?

If there were considerably less than 24 effective opportunities given to residents and stakeholders to express forestry related concerns and be proactively involved in the planning process, adequate attention would not be given to valuable public input. Public input into the SFM process is required to adequately consider other resource values within the DFA. If considerably less than 24 effective opportunities were given, public participation into SFM would decrease and impacts to other resource values such as cultural heritage, non-timber forest resources and biological richness could potentially occur. If these other forest values are not fully realized, economic values could also potentially decrease. An example of this would be the reduced local input to non-timber forest values and an eventual decrease in economic returns from these values if they were not fully realized.

It is anticipated that the number of effective opportunities for residents and stakeholders to express forestry related concerns and be proactively involved in planning processes will be maintained or reduced as more emphasis is placed on strategic level input and related planning. Initial benchmarking data will help to indicate how the future trend of this measure is likely to proceed.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual Improvement will be focused on evaluating the effectiveness of the proactive planning process at the strategic / landscape level vs. operational practices.

4.58 Public Review of SFM Plan

Statement of Measure	Management Objective
7-2.1 The number of times the SFM plan and associated annual reports will be communicated to the public for review and comment annually.	Annually, the SFMP and associated annual reports will be communicated to the public ≥ 1 (0-variance) time.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** The collective understanding of Sustainable Forest Management by the forest industry and the public is increased.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development • Element 6.3 – Public Participation • Element 6.4 – Information for Decision Making

What is this measure?

This measure is one of a group of measures that will help to increase the overall understanding of SFM. This SFMP and the resulting annual reports will be communicated to the public at least once per year either through a public open house or by a posting on the Internet.

Current practices and state of measure

To date, one public open house has been held in the Vanderhoof DFA at the start of the PAG process. A similar open house process will be initiated each fall in order to report on SFM progress and to increase the overall public understanding of SFM and how it is implemented in the DFA. The SFMP will also be posted on a website hosted by one of the Licensee Team members or through the Vanderhoof IFPA for easy public access.

How are targets established?

The target for this measure was based on past practice with other public plans and open house processes. Past performance indicates that 1 open house function each year is enough to accomplish the required tasks. However, if future monitoring and reporting exercises indicate that the target is set too low, steps will be taken to adjust the target to better suit the needs of the public and the Licensee Team.

How will this measure be implemented, monitored and reported?

Monitoring and reporting tasks will depend on the method of public review chosen by the Licensee Team. If the open house method is chosen, these venues will be arranged to occur at least once per year. Minutes will be taken from these open house meetings and this information will be collated and tracked with a database system chosen by the Licensee Team member. The database will then be queried for a report on this measure on an annual basis. If the SFMP is posted on the internet, a tracking device will be attached to the website to record the number of online visitors. Posting of the plan will also be recorded and tracked so that the plan is available annually and reported on annually.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, there was no SFM plan available for public review.

b) Implementation of SFMP: Opportunities for public review of the SFM plan will be tracked by the Licensee Team and reported out annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

Forecasting for this measure is much like the other measures that deal with public input and is therefore not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. The number of times the SFMP and associated annual reports will be communicated to the public for review and comment directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of ≥ 1 , one other potential scenario should be developed:

a) What if the SFMP and associated annual reports were not communicated to the public?

If the SFMP and associated annual reports were not communicated to the public, adequate attention would not be made to valuable public input. Without local public comment, this plan would potentially not be adequately localized to the Vanderhoof DFA. Sustainability of the forest resource would be more difficult to achieve as locally important values might be overlooked without sufficient public input. If these other forest values are not fully realized, economic values could also potentially decrease. An example of this would be the reduced local input to non-timber forest values and an eventual decrease in economic returns from these values if they are not fully realized. Another potential effect of not communicating the SFMP and associated annual reports to the public for review and comment could be a reduced public acceptance of the plan and, as with previous measures, potential skepticism of the overall intent. General understanding of SFM and resulting initiatives would also likely be reduced and future goals identified by the Licensee Team would be more difficult to achieve.

It is anticipated that the SFMP and associated annual reports will be communicated to the public at least once per year. Future trends of this measure are dependent on feedback received from the public as to whether the target is sufficient for meaningful consultation for the Vanderhoof SFMP.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual Improvement will be focused on evaluating the effectiveness of annual reporting to the public.

4.59 SFM Extension Activities

Statement of Measure	Management Objective
7-2.2 The number of opportunities provided for SFM extension activities annually.	Annually, sustain ≥ 4 (-1 variance) SFM extension opportunities.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** The collective understanding of Sustainable Forest Management by the forest industry and the public is increased.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development • Element 6.3 – Public Participation • Element 6.4 – Information for Decision Making

What is this measure?

This measure will help to ensure that the collective understanding of SFM by the forest industry and the public is increased. This measure was designed to monitor the number of times the Licensee Team members promote SFM within the communities in the DFA and the number of opportunities the Licensee Team provides for SFM awareness training for forest industry employees. Each year, a DFA wide plan will be developed to outline activities that will support SFM extension and information sharing. Table 32 outlines SFM extension activities that could occur within the DFA over time.

Table 32. SFM Extension Opportunities within the Vanderhoof Defined Forest Area

Activity Description	Audience
Direct support for education and training programs	Public
Conducting tours of Licensee Team woodlands and mill facilities	Public
Supporting and becoming involved in community and education events	Public and Forest Industry
Supporting interpretative sites or other hands on SFM facilities	Public and Forest Industry
Maintenance of a website with recent science and technology innovations	Public and Forest Industry
Supporting teacher-aid packages and student or career mentoring programs	Public
EMS training sessions	Forest Industry
SFM awareness training	Forest Industry
In-house SFM Information sessions	Forest Industry

Current practices and state of measure

A formal plan for extension activities has never been produced in the Vanderhoof DFA. However, extension activities have always been in place and future opportunities will be centered on promotion of SFM in order to ensure proper knowledge is flowing between industry and the public within the DFA. For the period April 1, 2003 to March 31, 2004, the Licensee Team held 8 PAG meetings and 1 SFM Open House for SFM extension activities.

How are targets established?

The target was set based on an analysis of past extension activities that have taken place within the DFA. Previously these activities did not specifically relate to SFM extension but are expected to in the future. Therefore, the target is set at ≥ 4 opportunities. This target is viewed as manageable by members of the Licensee Team and will be adjusted in the future if the need arises.

How will this measure be implemented, monitored and reported?

Extension activities will be identified within the SFMP and through the tracking systems of each individual Licensee Team member. Responsibilities and timelines will also be recorded and each year the SFMP will be reviewed to determine what extension activities were completed as planned.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, SFM extension activities were not offered within the DFA.

b) Implementation of SFMP: The Licensee Team will organize SFM extension activities and the hosting Licensee will track these events. The number of SFM extension activities throughout the DFA will be summarized and reported annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame as it is dependent on many other variables. However, it is important to identify what the accepted target means to SFM. The annual number of opportunities provided for SFM extension activities directly affects many of the social values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of ≥ 4 , one other potential scenario should be developed:

a) What if there were no annual opportunities provided for SFM extension activities?

If there were no annual opportunities provided for SFM extension activities in the DFA, overall understanding of the SFM process would decrease. SFM is based on science that readily changes over time and it is important for members of the public as well as the Licensee Team to stay informed of these changes and understand how they relate to the local DFA. Lack of understanding could in turn potentially reduce the quality of life for the public within the DFA as extension opportunities provide the opportunity for increased knowledge of forestry and forest practices. Reduced understanding of SFM could also potentially lead to a decrease in participation by the public in the SFM process. In turn, sustainability of the forest resource would be more difficult to achieve as locally important values might be overlooked without sufficient public input. Overall public acceptance of the plan might also decrease if SFM extension opportunities were not offered and future goals identified by the Licensee Team would be more difficult to achieve. This may also lead to a decreased opportunity for the public to contribute continual improvement initiatives for SFM across the DFA.

It is anticipated that four or more SFM extension opportunities will be provided annually. Future trends of this measure are dependent on the overall SFM process and future advances to the process identified through other local, provincial, national and global initiatives.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual Improvement will involve a review and priority ranking of SFM issues with the PAG. As a result extension opportunities will be provided accordingly.

4.60 Increase the Level of Understanding of SFM Annually

Statement of Measure	Management Objective
7-2.3 Increase the level of understanding of SFM annually.	Annually, sustain an understanding index of ≥ 4 (-0.5 variance).

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.
- **Local indicator:** The collective understanding of Sustainable Forest Management by the forest industry and the public is increased.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 6 – Accepting Society’s Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.3 – Public Participation • Element 6.4 – Information for Decision Making |
|---|

What is this measure?

This measure will help to ensure that a collective understanding of SFM by the forest industry and the public is increased over time. This measure will monitor and promote understanding of SFM within the communities in the DFA. Each year a questionnaire will be distributed to members of the public, Aboriginal people, forest industry employees and various stakeholders within the DFA. Results of the questionnaire will help to identify the strengths and weaknesses in the overall community understanding of SFM principle and practices.

Current practices and state of measure

Currently, Licensee Team members have no formal method to determine the level of understanding of SFM from the public or forest industry employees throughout the DFA. Approximately six months after certification, a questionnaire will be developed by the Licensee Team and then distributed to members of the public, Aboriginal people, forest industry employees and various stakeholders. Depending on the results of the initial questionnaire and subsequent annual surveys, strategies will be developed to maintain or enhance the level of understanding of SFM among these groups. Surveys completed after the implementation of new strategies will help to determine if the strategies are effective and if targets are being met.

How are targets established?

Initial targets for this measure were set at an understanding index of ≥ 4 . The understanding index is similar to the satisfaction index in that it is a numerical rating system composed of the following values:

- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = very good

The Licensee Team determined that an overall average score of 4 out of 5 would be an acceptable understanding level target. Depending on the results of the initial survey, strategies will be developed to maintain or enhance the overall public understanding of SFM. Subsequent annual surveys will determine if these strategies are effective and whether the target should be adjusted in the future.

How will this measure be implemented, monitored and reported?

Once the questionnaire is developed and distributed, and the first set of results is obtained, the data will be summarized and reported out by the Licensee Team annually. The format of this summary data will likely be a chart indicating the level of understanding in reference to a target line. The list of recipients of the questionnaire will not be a static list and will change over time as interest groups dissolve and new ones form. Data from questionnaires will be solicited, summarized and reported on an annual basis.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, SFM was not a specified management direction and increase of awareness of SFM was not generally a priority.

b) Implementation of SFMP: With SFM becoming an important management style in forestry, increased understanding of SFM by the public and the forest industry will be pursued through public involvement and extension activities. Overall understanding of SFM will be solicited through the distribution of a questionnaire to members of the public and the forest industry. Questionnaire results will be summarized and reported annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

As with the previous measure, this measure is not easy to quantifiably forecast over a defined time frame, as it is dependent on many other variables. However, it is important to identify what the accepted target means to SFM. The level of understanding of SFM directly affects many social values. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of ≥ 4 , one other potential scenario should be developed:

a) What if the understanding index was less than 4?

If the understanding index was less than four, it can be assumed that the overall understanding of the SFM process would decrease. SFM is based on science that readily changes over time and it is important for members of the public as well as the Licensee Team to stay informed of these changes and understand how they relate to the local DFA. Like the previous measure, a lack of understanding could in turn potentially reduce the quality of life for the public within the DFA as the SFM process provides the opportunity for increased knowledge of forestry and forest

practices. Reduced understanding of SFM could also potentially lead to a decrease in participation by the public in the SFM process. In turn, sustainability of the forest resource would be more difficult to achieve as locally important values might be overlooked without sufficient public input. Overall public acceptance of the plan might also decrease if overall understanding of SFM decreased and future goals identified by the Licensee Team would potentially be more difficult to achieve.

It is anticipated that the future understanding index will be sustained at a level of four or greater in order to achieve a balance of future SFM values. Future trends of this measure are dependent on the overall SFM process and future advances to the process identified through other local, provincial, national and global initiatives. Initial questionnaire distribution and gathering of baseline data will be the first step necessary to evaluate the likely trend of this measure.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual Improvement will involve an analysis of the results of the public questionnaire to assess the effectiveness of extension opportunities enhancing the level of SFM understanding.

4.61 Opportunities for First Nations to be involved in the Planning Process

Statement of Measure	Management Objective
8-1.1, 8-3.1 The number of opportunities provided to Aboriginal people to be involved in the planning process.	Annually, sustain ≥ 12 opportunities (-2 variance) for Aboriginal people to be involved in the planning process.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** Forest management recognizes and respects Aboriginal treaty rights.
- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** The opportunity by Aboriginal communities to participate in SFM.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| <p>Criterion 6 – Accepting Society’s Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.1 – Aboriginal and Treaty Rights • Element 6.2 – Respect for Aboriginal Forest Values, Knowledge and Uses |
|--|

What is this measure?

This measure was designed to list and report out on all documented opportunities provided to Aboriginal people to be involved in forest management planning processes. Incorporation of

Aboriginal people and their unique perspective into the forest planning process is an important aspect of SFM. This measure will contribute to respecting the social, cultural and spiritual needs of the people who traditionally and currently use the DFA for the maintenance of traditional aspects of their lifestyle.

The Vanderhoof SFM PAG is a process designed to identify public values and objectives within the DFA. Within the PAG process, a First Nations' communications strategy has been developed and implemented to provide additional opportunities for First Nations to be involved in the SFM planning process. Ensuring that Aboriginal communities are involved in the PAG processes will provide the ability to recognize unique interests of Aboriginal communities on a strategic level.

Current practices and state of measure

Members of the Licensee Team currently have individual working relationships with local First Nations in the DFA and two specific First Nations have had representation at the Public Advisory Group table. All of these First Nations communities have had the opportunity for participation and input in the SFM planning process. In order to maintain a high level of participation and response, Licensee Team members have also engaged First Nations in their communities as requested, in order to provide an opportunity for involvement in the Vanderhoof SFMP. Table 33 lists the current status of opportunities that were made available for First Nations to become involved in the planning process throughout the DFA.

Table 33. Number of Opportunities for First Nations to be Involved in the Planning Process

Opportunity Type	Number of Opportunities
Open House	1
Letters	33
Newspaper Ads	25
Pest Management Prescriptions	2
Community Natural Resource Committee	4
TOTAL	65

How are targets established?

First nation communities have been reluctant to participate in these planning processes, due to the sensitivity surrounding treaty negotiations. A substantial time commitment is also necessary for effective Aboriginal participation. However, the current target is set to ensure that the Licensee Team continues to provide at least 12 opportunities for involvement per year. This target was based on the opportunities that arose from the SFM PAG process as well as from the FSP process.

How will this measure be implemented, monitored and reported?

FDPs (and later, FSPs) prepared under the premise of this SFMP will provide Aboriginal communities within the DFA with an opportunity to actively participate in the SFM planning process. This type of public involvement is generally initiated through a request to provide input prior to the submission of the FDP. If Aboriginal communities express an interest in the FDP/FSP planning area, subsequent opportunities are made to ensure communication around identified areas of concern occurs and is fully documented.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, opportunities for involvement of First Nations in the planning process were available, but were not formally tracked, monitored and reported out.

b) Implementation of SFMP: Opportunities for involvement of First Nations in the planning process will be tracked by each Licensee Team member. This information will be summarized and reported out annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. The number of opportunities provided to Aboriginal people to be involved in the planning process directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of ≥ 12 , one other potential scenario should be developed:

- a) What if considerably less than 12 opportunities were given to Aboriginal people to become involved in the planning process?

If there were considerably less than 12 opportunities given to Aboriginal people to become involved in the planning process, adequate attention would potentially not be given to valuable Aboriginal input. Aboriginal input into the SFM process is required to adequately consider cultural heritage values within the DFA and to ensure that forest management respects treaty rights. If considerably less than 12 opportunities were given, significant loss of First Nation's cultural features could occur. Aboriginal participation into SFM would decrease and impacts to other resource values such as cultural heritage, non-timber forest resources and biological richness could potentially occur. Traditional knowledge could also potentially be lost if opportunities are not given to Aboriginal people to become involved in the planning process within the DFA.

It is anticipated that the number of opportunities given to Aboriginal people to become involved in the planning process will be sustained at a level of 12 opportunities or greater over time, as the Aboriginal people become more involved with the SFM process.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will work cooperatively with First Nations to solicit their involvement and input into the planning process. Continual Improvement will also focus on assessing the effectiveness of these input opportunities.

4.62 Review of PAG Terms of Reference to Recognize Treaty Rights

Statement of Measure	Management Objective
8-1.2 The SFMP PAG Terms of Reference will be reviewed annually to recognize that Aboriginal participation in the public process will not prejudice Aboriginal treaty rights.	Annually, the PAG Terms of reference will be reviewed to ensure that the public process will not prejudice Aboriginal treaty rights 100% (0% variance) of the time.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** Forest management recognizes and respects Aboriginal and treaty rights.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| <p>Criterion 6 – Accepting Society’s Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.1 – Aboriginal and Treaty Rights |
|--|

What is this measure?

It is the intent of the Licensee Team to respect all duly established Aboriginal and Treaty rights. This measure was designed to ensure the PAG Terms of Reference respects Aboriginal treaty right and participation without prejudice.

Current practices and state of measure

The Vanderhoof SFMP PAG Terms of Reference was approved January 15th, 2004. This document speaks directly to the issue of Aboriginal and treaty rights and that Aboriginal people’s participation in the PAG process will not prejudice these rights. Participation in all aspects of the PAG by Aboriginal people in the DFA is an important part of the SFM process. Licensee Team members and members of the PAG will continue to work together to ensure that Aboriginal participation will never prejudice current and future Aboriginal or treaty rights within the DFA.

How are targets established?

The target for this measure was established at 100% because at no time would it be acceptable to achieve anything less than that. The PAG is an open and transparent process and will continually ensure that Aboriginal participation will occur without prejudice to Aboriginal or treaty rights within the PAG process.

How will this measure be implemented, monitored and reported?

Monitoring of this measure will occur with the annual review of the PAG Terms of Reference. Upon each review, the Terms of Reference will be analysed to ensure that Aboriginal participation will not prejudice Aboriginal or treaty rights as these rights continually develop over the DFA. This measure will be reported to the Licensee Team prior to each annual report of the

SFMP so that the annual report can be released with the confidence that prejudice against Aboriginal or Treaty rights within the PAG process has not occurred.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, there was no Public Advisory Group Terms of Reference.

b) Implementation of SFMP: The Public Advisory Group Terms of Reference will be reviewed at one of the scheduled meetings throughout the year to ensure the document continues to recognize that Aboriginal participation in the public process will not prejudice Aboriginal treaty rights. The review of the Terms of Reference will be documented tracked and reported out to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. Annual review of the SFMP PAG Terms of Reference to ensure it is recognized that Aboriginal participation in the public process will not prejudice Aboriginal treaty rights directly affects the social values identified within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target of annual review, it is important to identify one other potential scenario:

- a) What if the PAG Terms of Reference document was never reviewed to ensure that Aboriginal participation in the public process would not prejudice Aboriginal treaty rights?

If the PAG Terms of Reference document was never reviewed to ensure that Aboriginal participation in the public process would not prejudice Aboriginal treaty rights, there would be a chance that treaty rights could be negatively impacted. This could also lead to a loss of cultural heritage values as Aboriginal people would be less inclined to participate in the public process if treaty rights had the potential to be infringed upon. Loss of Aboriginal contribution into the SFM process could also potentially lead to a reduced capacity for inclusion of traditional knowledge into overall forest management. Overall, sustainability of the forest resource would likely be more difficult to achieve as locally important Aboriginal values might be overlooked without sufficient input. Aboriginal people may also potentially become skeptical of the overall intent of SFM and future goals identified by the Licensee Team would be more difficult to achieve.

From an analysis of the "what if scenario", it is clear that a balance of values can be achieved with an annual review of the PAG terms of reference to ensure that Aboriginal participation in the public process would not prejudice Aboriginal and treaty rights. As such, the Licensee Team is committed to maintaining and reviewing the PAG Terms of Reference on an annual basis.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will review the effectiveness of the PAG Terms of Reference and its abilities to not prejudice Aboriginal and treaty rights.

4.63 Level of First Nation Satisfaction with Forest Management

Statement of Measure	Management Objective
8-1.4 Annually, through a survey, measure the level of Aboriginal satisfaction related to forest management.	Annually, sustain a satisfaction index of ≥ 4 (-0.5 variance).

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** Forest management recognizes and respects Aboriginal and treaty rights.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| <p>Criterion 6 – Accepting Society’s Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.1 – Aboriginal and Treaty Rights • Element 6.2 – Respect for Aboriginal Forest Values, Knowledge and Uses |
|--|

What is this measure?

This measure is similar in nature to measure 7-1.5 in that it provides information relating to the level of satisfaction related to forest management in the DFA. However, it has been developed as a separate measure because it focuses on Aboriginal communities and their interactions with Licensee Team members with regards to their special uses, interests and values within the DFA. Satisfaction levels will be determined through the use of an annual survey, which will be distributed to Aboriginal people based on previous interactions with Licensee Team members regarding expressions of interest or value within the DFA. It is important to recognize that Aboriginal people play a special role in SFM within the DFA. Management of forest resources toward the principles of SFM requires effective interaction with Aboriginal people and the ability of the Licensee Team members to respond to their unique needs within the DFA.

Current practices and state of measure

There is currently no formal method to solicit information regarding the satisfaction of Aboriginal communities that interact with Licensee Team members. Previously, members of the public, including Aboriginal people, could state their concerns with forest management practices by submitting formal letters stating concerns based on advertised public plans. While this is an adequate means of receiving public feedback, the development of a survey will solicit both positive and negative feedback from a much larger Aboriginal group. This measure proposes a survey to gather information from traditional and current Aboriginal users of the DFA regarding their satisfaction with forest management practices occurring in the DFA. This survey is the initial step toward deriving suitable targets for overall levels of satisfaction for the Aboriginal communities within the DFA.

How are targets established?

Initial targets for this measure were set at a satisfaction index level of ≥ 4 . The satisfaction index is a numerical rating system composed of the following values:

- 1 = very poor
- 2 = poor
- 3 = average
- 4 = good
- 5 = very good

The Licensee Team determined that an overall average score of 4 out of 5 would be an acceptable satisfaction level target. Depending on the results of the initial survey, strategies will be developed to maintain or enhance Aboriginal user satisfaction. Subsequent annual surveys will determine if these strategies are effective and whether the target should be adjusted in the future.

How will this measure be implemented, monitored and reported?

As no current survey exists, implementation of this measure will involve the development and distribution of a survey approximately six months after certification. The survey will gauge the level of satisfaction of Aboriginal people in the DFA to current forest management activities. The Licensee Team will identify a list of individuals that have had past interactions concerning forest management activities within the DFA. These individuals will receive the initial confidential survey, which will then be collated and analysed for future improvement measures. The survey will be distributed on an annual basis with a review of the list of recipients taking place annually as well.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, the level of Aboriginal satisfaction related to forest management was never formally measured.

b) Implementation of SFMP: A satisfaction survey will be developed and distributed to Aboriginal groups with interests in the DFA. Results of the survey will be summarized and reported out annually to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends

This measure is not easy to quantifiably forecast over a defined time frame as it subjective in nature and depends on many aspects of the SFM process. However, it is important to identify what the accepted target means to SFM. The level of satisfaction of Aboriginal people with the SFMP process primarily affects the social values identified within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at greater than or equal to four, one other scenario should be identified:

- a) What if the satisfaction index was less than four?

If the satisfaction index for Aboriginal people was less than four, social values of SFM could potentially be reduced. Public participation requirements would not be fulfilled if local Aboriginal people were not satisfied with the process because they would have no incentive to continue participating. Without local Aboriginal comment, this plan would potentially not be adequately localized to the Vanderhoof DFA. Sustainability of the forest resource would be more difficult to achieve as locally important cultural heritage values might be overlooked without

sufficient Aboriginal input. Another potential effect of the satisfaction of Aboriginal people falling below the target could be a reduced acceptance of the plan and potential skepticism of the overall intent. General understanding of SFM and resulting initiatives would also likely be reduced and future goals identified by the Licensee Team would be more difficult to achieve.

Due to the significant impact this measure could have on important social values of SFM, the Licensee Team is committed to achieving a satisfaction index level of ≥ 4 with regards to Aboriginal people and the SFM process. It is anticipated that Licensee Team members will sustain a good working relationship with local Aboriginal people and promote a consensus based decision making process, which in turn will keep satisfaction levels high.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will continue to improve on the effectiveness of the questionnaire to assess the level Aboriginal satisfaction with the SFM process. Once the Licensee Team determines the concerns and shortfalls, a documented change of management process will be implemented to improve the survey process.

4.64 Management Plans Approved by the Designated Decision Maker

Statement of Measure	Management Objective
8-1.5 The percentage of management plans approved in the DFA by the Delegated Decision-Maker.	Annually, sustain 100% (0% variance) of management plans approved in the DFA.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** Forest management recognizes and respects Aboriginal and treaty rights.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| <p>Criterion 6 – Accepting Society’s Responsibility for Sustainable Development</p> <ul style="list-style-type: none"> • Element 6.1 – Aboriginal and Treaty Rights • Element 6.2 Respect for Aboriginal Forest Values, Knowledge and Uses |
|--|

What is this measure?

The premise behind this measure is the theory that if the Delegated Decision Maker (DDM) approves a management plan submitted by any of the Licensee Team members then it must recognize and respect Aboriginal and treaty rights. These management plans (operational plans) require approval by a DDM. Recognizing and respecting Aboriginal and treaty rights is an essential component for accomplishing SFM on the DFA.

Current practices and state of measure

Within the DFA all FDPs have been approved by the Delegated Decision Maker. The conservation of cultural heritage resources and consultation processes are in place to ensure Aboriginal and treaty rights are recognized and respected. Licensee Team members will continue to follow the Heritage Conservation Act, the FPC and eventually FRPA in order to receive future approval for 100% of submitted management plans.

How are targets established?

When a DDM approves a management plan, the approval is based, in part, on how the plan recognizes and respects Aboriginal and treaty rights. Therefore, it is the intent of the Licensee Team to have 100% of all DFA management plans approved by the DDM.

How will this measure be implemented, monitored and reported?

Monitoring of this measure will occur via the receipt of approval of management plans that are submitted to the DDM. Licensee Team members will track management plan submissions and subsequent approvals in order to report out annually to the Licensee Team as a whole to ensure the target has been achieved.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, all Forest Development Plans have been approved by the Delegated Decision Maker, but this information was not formally tracked, monitored and reported out.

b) Implementation of SFMP: Receipts of approval of management plans that have been submitted to the Delegated Decision Maker will be tracked by each Licensee Team member. On an annual basis, this information will be summarized for the DFA and reported out to ensure the target is achieved. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is dependent on other variables. However, it is important to identify what the accepted target means to SFM. Receiving approval of management plans by the Delegated Decision Maker relates to economic and social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As the target for this measure is currently set at 100%, one other potential scenario should be analysed:

- a) What if only 50% of management plans were approved in the DFA by the Delegated Decision Maker?

If only 50% of management plans were approved in the DFA by the Delegated Decision Maker (DDM), many forest industry operations may not occur. This could in turn lead to a reduced local economy from a reduction in jobs and overall decrease in revenue realized from the forest resource. As a result, quality of life values within the DFA could also potentially decrease. Within the Vanderhoof DFA, this scenario could also have negative impacts to timber supply in the short-term as a result of the mountain pine beetle infestation. If only 50% of management plans were approved by the DDM, mortality of the timber resource from mountain pine beetle

would not be adequately managed. This may result in an increase in the amount of dead trees throughout the DFA, which in turn could have other ecological, economic and social implications as defined in other measures.

In order to trend toward SFM and achieve a balance of values within the DFA, the Licensee Team will strive to have 100% of all management plans in the DFA approved by the DDM in the future.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual Improvement will focus on the effectiveness of this measure to ensure forestry management recognizes and respects Aboriginal and treaty rights.

4.65 Number of Socio-economic Opportunities Available to Aboriginals

Statement of Measure	Management Objective
8-2.1 The number of socio-economic opportunities made available annually.	Annually, sustain ≥ 10 (-2 variance) socio-economic opportunities.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** Maintain Aboriginal access to forest resources and socio-economic benefits.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits Criterion 6 – Accepting Society's Responsibility for Sustainable Development • Element 6.1 – Aboriginal and Treaty Rights

What is this measure?

Providing business relationships, opportunities and cooperative working arrangements with Aboriginal people will help to provide mutual social, cultural and economic benefits to communities within the DFA, which is a vital aspect relating to the success of SFM. The majority of the Licensee Teams' suppliers, contractors and employees are retained from communities within the DFA and northern British Columbia. However, Aboriginal communities are often not well represented within this distribution, even though they are most often geographically and economically the most connected to local forest operations. This measure will monitor the number of socio-economic opportunities that are made available to people from local Aboriginal communities over time.

Current practices and state of measure

Socio-economic opportunities relate to many different business ventures including a business relationship, an opportunity for employment, a training opportunity, or sponsorship of community

events and organizations. The Licensee Team is comprised of several different companies and each one has developed different types of relationships with different First Nations across the DFA. Therefore, it is most inclusive and accurate to identify all types of opportunities and relationships that currently exist between Licensee Team members and local First Nations communities (refer to Table 34).

Table 34. Local First Nation Communities and Socio-economic Opportunity Types

Opportunity Type	Number
Training and Extension Opportunities	1
Forest Management Employment Opportunity	2
Silviculture Employment Opportunity	7
Harvesting Employment Opportunity	13
Total	23

These opportunities were not formally tracked in the past, but review of Licensee Team members/ First Nations relationships suggests that Licensee Team members' have made twelve socio-economic opportunities available to First Nations communities within the DFA. Due to privacy constraints, some details regarding these socio-economic ventures will remain in confidence because of the public nature of this plan. However, it can be stated that the socio-economic ventures offered within the DFA range in monetary size and variety of benefits.

How are targets established?

The target for this measure was established based on a review of past practices and any reasonable expectations for growth or fluctuations from year to year. Over the long-term, the Licensee Team expects to sustain at least ten socio-economic opportunities with First Nations.

How will this measure be implemented, monitored and reported?

To administrate this measure, Licensee Team members will report individual company opportunities made available and any achievements realized throughout the year. These items will be tallied among all Licensee Team members to ensure the target is achieved.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, socio-economic opportunities for First Nations were present, but they were never formally tracked, monitored and reported.

b) Implementation of SFMP: Socio-economic opportunities for First Nations will be tracked by each Licensee Team member and reported out on an annual basis to ensure targets are being met. This measure will not be implemented through Operational Plans.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast through the modeling process over a defined time frame. However, it is important to identify what the accepted target means to SFM. The use of a "what if scenario" can be beneficial in identifying anticipated future trends for a measure such as this. The number of socio-economic opportunities made available annually to local First Nations is an important aspect of SFM because it directly relates to sustaining the local economy. As the target for this measure is a value greater than or equal to six, one other scenario should be analysed:

a) What if no socio-economic opportunities were made available to local First Nations?

If no socio-economic opportunities were made available to local First Nations, two important values would be at risk. The first, and most important of these would be a reduction in the overall sustainability of First Nations communities within the Vanderhoof DFA. Local business relationships and opportunities that can be formed with First Nations within the DFA will keep the economic benefits derived from the forest industry at a local level. Socio-economic opportunities offered to First Nations also allow for First Nations to share in a portion of the benefits received from the forest industry.

The second risk involved with offering no socio-economic opportunities to local First Nations could be the potential lack of localized knowledge and experience that would otherwise not be realized. Local First Nations are often considered to have the most local historical knowledge and experience with the land base in the Vanderhoof DFA. Utilizing this knowledge and experience through potential socio-economic opportunities could potentially mutually benefit First Nation communities and the forest industry, and in turn would also benefit the overall public. By venturing into socio-economic ventures with local First Nations, the public may potentially receive more valuable services based on locally applied knowledge and experience.

The target and future ability to achieve the target are directly dependent on the state of the economy and the availability of opportunities based on activities being conducted in each particular year. However, due to the significant impact this measure could have on the local economy, the Licensee Team is committed to achieving the target of ≥ 10 socio-economic opportunities with local First Nations.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual Improvement will focus on the Licensee Team developing a methodology to weigh the First Nations significance of each socio-economic opportunity made available.

4.66 Number of Traditional Use Studies Used in the Planning Process

Statement of Measure	Management Objective
8-3.2 The number of Aboriginal forest based Traditional Use Studies (TUS) or knowledge information used in the planning processes.	Annually, sustain the use of ≥ 1 (0 variance) Traditional Use Study or other type of knowledge information in the planning process.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains or enhances the culture, health and capacity benefits that Aboriginal people derive from forest resources.
- **Local indicator:** The opportunity by Aboriginal communities to participate in Sustainable Forest Management.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 6 – Accepting Society’s Responsibility for Sustainable Development • Element 6.2 – Respect for Aboriginal Forest Values, Knowledge and Uses
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What is this measure?

This measure was developed in order to recognize the importance of the use of traditional information in the planning process. This measure contributes to respecting the social, cultural and spiritual needs of local Aboriginal people who have traditionally and who currently use the forest resource within the DFA for the maintenance of the traditional aspects of their lifestyle. Working with local Aboriginal people to identify, define and develop management strategies that encompass traditional values and uses is an important component of the forest industry’s SFM initiative.

It is important to note that this measure does not apply to general Aboriginal values that may or may not be expressed through the public participation process. This measure specifically relates to traditional use studies where information has been validated through traditional or scientific knowledge from both within and outside of First Nations communities.

Current practices and state of measure

During the time frame of SFMP development, no Traditional Use Studies have been brought forth for use within the DFA. Licensee Team member’s ability to effectively manage for traditional values that may be identified in Traditional Use Studies is dependent upon the completion of these studies and the First Nations communities providing access to certain information. Until that time, the following steps will be followed by Licensee Team members with regards to traditional information used in the development of management plans:

- Continue with ongoing relationship building processes with First Nations to encourage meaningful engagement and input into the development of management plans.
- Engage in and record all communications and meetings with First Nations (including attempts) to garner input on the development of management and operational plans.

- Seek to gain access to site-specific information about traditional values and uses (subject to confidentiality agreements) during the development of management and operational plans.
- Work with First Nations in an attempt to develop joint agreement on operational strategies to manage for site-specific traditional values and uses.
- Implement strategies in operational plans to address all site specific known values and uses, included in the scope of this measure, that are identified during referrals of major plans.

How are targets established?

Licensee Team is aware of one TUS having been completed within the DFA. Incorporation of this data into operational plans has not been feasible to date. In cooperation with First Nations the Licensee Team will attempt to identify traditional use information that can be utilized in planning.

How will this measure be implemented, monitored and reported?

Until Traditional Use Studies or other forms of traditional knowledge are available for use, Licensee Team members will work with existing methods of acquiring and utilizing traditional knowledge. Licensee Team members will record all strategies utilized to manage for known, site-specific traditional values in the DFA. Information used will be summarized in the planning process, subject to confidentiality agreements. Cultural heritage resources will continue to be identified and maintained in accordance with legal requirements across the DFA.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, Traditional Use Studies were not available for use in the planning process.

b) Implementation of SFMP: The Licensee Team will utilize all forms of traditional use available and attempt to incorporate this information into the planning process to ensure Aboriginal interests are conserved where possible. Traditional use information requires cooperative working arrangements between the Licensee Team and local First Nations groups. If obtained, traditional use information will be incorporated generally at the Forest Development Plan (Forest Stewardship Plan) stage and occasionally in the Site Plan if the information is site specific in nature.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame. However, it is important to identify what the accepted target means to SFM. The number of Aboriginal forest based Traditional Use Studies (TUS) or knowledge information used in the planning process directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of equal to or greater than one, only one other potential scenario will be analysed:

- a) What if no Aboriginal based Traditional Use Studies or knowledge information was used in the planning process?

If no Aboriginal based Traditional Use Studies or knowledge information was used in the planning process, adequate attention would potentially not be given to valuable Aboriginal knowledge and input. Aboriginal cultural knowledge and subsequent input into the SFM process is required to adequately consider cultural heritage values within the DFA and to ensure that forest management respects treaty rights. If no TUS or knowledge information is used in the planning process, Aboriginal participation into SFM could decrease and impacts to other resource values such as cultural heritage, non-timber forest resources and biological richness could potentially occur. If these other forest values are not fully realized, economic values could also potentially decrease. An example of this would be the reduced Aboriginal input to non-timber forest values and an eventual decrease in economic returns from these values if they are not fully realized. Traditional knowledge could also potentially be lost if opportunities are not given to Aboriginal people to become involved in the planning process within the DFA. Finally, by not utilizing available TUS or knowledge information Licensees in the DFA could potentially infringe on Aboriginal treaty rights.

It is anticipated that TUS or knowledge information will be used in the planning process in the future as it becomes available to the Licensee Team. Once TUS or traditional knowledge is identified, the future trend of this measure will be more easily forecasted.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will focus efforts on obtaining TUS information that can be incorporated into the planning process and used at an operational level.

4.67 Number of Hectares and Proportion of DFA with Planned Access

Statement of Measure	Management Objective
9-1.1 The number of hectares and percent of the DFA that has planned access (restrictions and non-restrictions) in place by access management area to provide a diversity of recreation opportunities.	Annually, sustain 262,718.4 ha or 31.5% (0 variance) of the DFA in planned access areas.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain opportunities for outdoor recreation activities.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

Criterion 5 – Multiple Benefits to Society • Element 5.1 – Timber and Non-timber Benefits
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What is this measure?

Previous solicitation from members of the public has indicated that the public desires access control (access limitations to motorized vehicles) where the protection of a specific value is deemed more important than the option of non-controlled access. Within the Vanderhoof Forest District, an Access Management Plan was developed to provide a balance of restricted and non-restricted access based on input received through a public process where various stakeholders were involved. In order to provide a balance between ecological, economic and social values within the DFA, a wide variety of access types are required. This measure was developed to maintain the balance between restricted and non-restricted road access based on the Vanderhoof Access Management Plan. As such, this measure assumes that the current amount of each type of access is within an acceptable equilibrium that was developed and delivered via the Access Management Plan development process. The BC Ministry of Forests currently assumes the responsibility for adherence to the plan.

Current practices and state of measure

Access management areas within the DFA were initially defined through the Vanderhoof LRMP process (1997) (see Figure 16, taken from Vanderhoof LRMP 1997). From these defined access management areas, the Access Management Plan was developed to identify access restrictions and non-restrictions based on the feedback obtained from the public participation process that occurred as part of the development of the plan. As this plan is the most current collaboration of access management information within the DFA, the data has been adopted as the current practice.

How are targets established?

As the current practice involves adherence to the Vanderhoof Access Management Plan, this document was also used to define a target for this measure. An analysis of area under access management through the use of a GIS query resulted in a target of 262,718.4 ha (31.5%) of area within the DFA that will be maintained as access management area. The portion of the DFA to be maintained with no access management or restrictions is 571,523.6 ha or 68.5%. It must be realized that this measure and targets are dependent upon an external planning process and is governed by the Ministry of Forests. The annual reviews of the Access Management Plan will likely influence the target for this measure as the amount of area included in each access management area may change over time.

How will this measure be implemented, monitored and reported?

As this measure is based upon the Vanderhoof Access Management Plan, monitoring activities will need to revolve around the annual review of the plan that is conducted by the Ministry of Forests. Any changes made to the Access Management Plan will need to be reflected in this measure and the associated target. Results of the Ministry of Forests annual review will be reported to the Licensee Team so that the appropriate changes can be made to the overall target value. Data required to calculate and monitor the target of this measure includes:

- The number of hectares in access management areas from the Vanderhoof Access Management Plan
- The number of hectares not in access management areas from the Vanderhoof Access Management Plan

Figure 16. Access Management Areas in the DFA

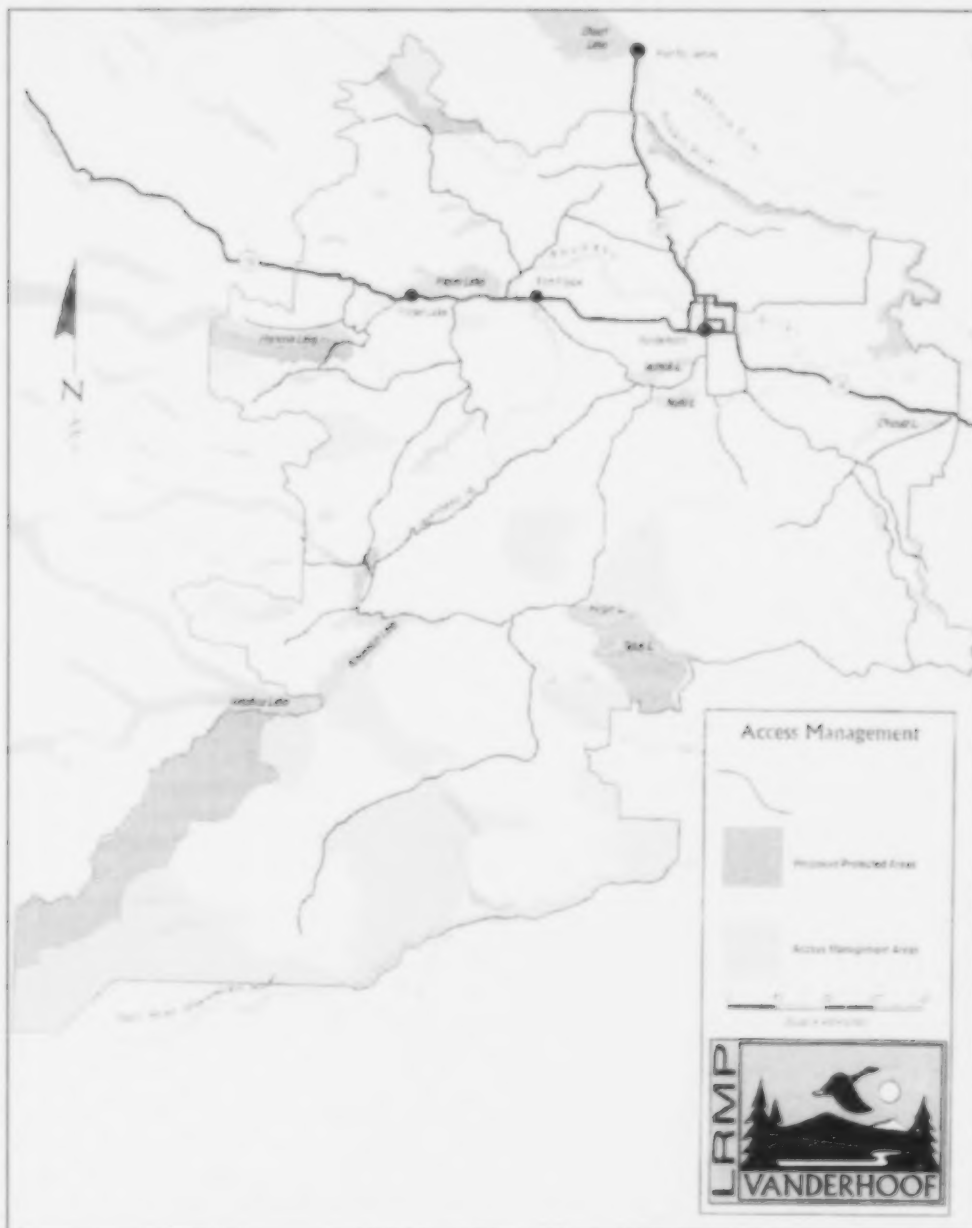


Figure 16. Access Management Areas in the DFA



Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, the DFA contained access planning through the Access Management Plan, but it was not formally tracked, monitored and reported by licensees.

b) Implementation of SFMP: Access will continue to be managed through the Vanderhoof Forest District Access Management Plan. The annual review of the Access Management Plan will be incorporated into this SFMP and the number of hectares with planned access in the DFA will be reported out annually. This measure is incorporated into Forest Development planning (Forest Stewardship planning) but will be monitored and reported out as a separate function.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is operational in nature. However, it is important to identify what the accepted target means to SFM. The number of hectares and percent of the DFA that has planned access in place by access management area to provide a diversity of recreation opportunities contributes to recreation values, quality of life values and economic values derived from other uses of the forest resource in the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. When forecasting a variable in this manner, it is useful to identify two potential scenarios:

- a) What if none of the DFA had planned access in place?
- b) What if all of the DFA had planned access in place?

If none of the DFA had planned access in place, it is anticipated that backcountry recreation opportunities would potentially decrease, certain quality of life values may decline, and economic values may also decrease. No planned access implies that there would be open access to all areas of the DFA. While this may increase certain roadside recreation activities, backcountry recreation value would likely decline. With open access, hunting opportunities would be increased throughout the DFA and wildlife populations and therefore certain quality of life values within the DFA could potentially decrease. Open access may also take away from guiding business and this could potentially reduce the economic values realized from non-timber forest resources.

On the other end of the spectrum, if all of the DFA had planned access in place ecological, economic and social values may also all potentially be negatively influenced. This scenario would imply that less free access was available across the DFA. While backcountry recreation values may potentially increase, roadside recreation opportunities would likely decrease. Economic values would be impacted through forest Licensees having to work in a restricted land base with increased access control. This could potentially raise operating costs for Licensees and reduce the economic return of the timber resource.

The current access management areas delineated in the Vanderhoof Access Management Plan are based on a balance of social and economic values. As these values change over time, the areas of restricted and non-restricted access within the DFA may change as well. If the annual review of the Access Management Plan results in changes to access designations then the target value will also change. This "what if scenario" analysis implies that a balance of values can be achieved through sustaining a level of planned access that lies somewhere in between the two scenarios. Although this level has not yet been fully identified through past experience, the Licensee Team

is committed to achieving the identified target and adaptively managing forest practices to achieve sustainability.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team will review this measure to assess its ability to sustain opportunities for a range of outdoor recreational activities.

4.68 Number of Forestry Management Operation Lost Time Accidents

Statement of Measure	Management Objective
9-4.1 The number of company related forestry management operation accidents each year (Lost Time Accidents (LTA)).	No (0) loss time company related forest management accidents. (+2 variance)

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain worker and public safety within the DFA.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| Criterion 5 – Multiple Benefits to Society <ul style="list-style-type: none">• Element 5.3 – Fair Distribution of Benefits and Costs |
|--|

What is this measure?

Health and safety of forest workers and members of the public is an important quality of life objective that is essential to SFM. All member companies of the Licensee Team consider employee and public safety as a primary focus of all forestry related operations. Evidence of this high priority can be seen in various company mission statements and individual EMS policies. This measure was developed to track and report out on the number of lost time workplace accidents that occur within the woodlands division of each Licensee Team member company. Operations conducted outside the woodlands division have been excluded from this measure, however the Licensee Team currently promotes safety in all aspects of forest management operations. Two types of workplace accidents are the most common within the forest industry including lost time accidents (LTA) or incidents where medical aid or treatment was necessary but no loss of work time was experienced by the employee. Through this measure, only LTA will be tracked and monitored.

Current practices and state of measure

According to the safety records kept by each Licensee Team member, one LTA was reported in 2003. The current status for this measure is derived through an analysis of safety reports and a tally of all LTAs.

How are targets established?

The target for this measure was established so that all Licensee Team members would operate toward a goal of no woodlands lost time accidents. However, a variance of 2 accidents is applied to this measure because due to the nature of the work involved within the forest industry, accidents will undoubtedly occur.

How will this measure be implemented, monitored and reported?

Each Licensee Team member's woodlands operation has a safety committee that is responsible for ensuring that standards are in place to promote safe work practices. All accidents are reported to a member of the safety committee once they occur and this is how LTAs will be tracked and monitored for reporting purposes. Monitoring and reporting the number of workplace LTAs will help Licensee Team members identify problems with procedures and increase overall awareness in order to prevent future injuries and LTAs.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, licensees internally tracked Lost Time Accidents through safety committees, but this information was not reported out.

b) Implementation of SFMP: Safety Committees of each Licensee Team member will continue to track and monitor Lost Time Accidents within their respective operations. This information will be summarized and reported out annually. This measure will not be implemented through Operational Plans, but will become a component of a licensee's EMS as each system is updated to incorporate SFM policy.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame because it is operational in nature. However, it is important to identify what the accepted target means to SFM. The number of company related, forestry management operation accidents each year relates directly to social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure states a target of zero, one other scenario should be analysed:

- a) What if more than the target amount of company related forestry management operation accidents occurred each year?

If more than the target amount of company woodlands LTAs occurred each year social values including quality of life would likely decrease throughout the DFA. Lost time accidents are usually directly related to safety issues in the workplace. If an employee's risk of being injured on the job increased, there would be less incentive to do the required work. Increased risk in the workplace would likely decrease the overall quality of life in the DFA and community stability would also likely decrease. For the Licensee, WCB and other related costs due to accidents in the workplace would likely increase. This would result in a potential decrease of economic values because full economic returns would not be realized from the forest resource. Licensee members are committed to maintaining worker and public safety as a high priority and will work towards achieving the stated target for this measure.

The "what if scenario" illustrates that a variety of social values and certain economic values could potentially be affected if the target for this measure were not achieved. In the future, the Licensee Team anticipates that the number of company related forestry management operation accidents each year will remain at or below the target.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. The Licensee Team has identified a continual improvement potential for the development of a methodology to assess and weight the severity of each LTA in order to focus future safety programs.

4.69 Forest Road Inspections That Meet Defined Safety Standards

Statement of Measure	Management Objective
9-4.2 The percent of road inspections meeting defined safety standards.	Annually, sustain 100% (-2% variance) of road inspections that meet defined safety standards.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain worker and public safety within the DFA.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|--|
| Criterion 5 – Multiple Benefits to Society <ul style="list-style-type: none">• Element 5.3 - Fair Distribution of Benefits and Costs |
|--|

What is this measure?

As mentioned in the previous measure the health and safety of forest workers and members of the public is an important quality of life objective that is essential to SFM. This measure is important to SFM because safe road use is an important aspect of overall forestry worker and general public safety. Overall road safety involves maintaining road surfaces and access structures such as bridges at a required safety standards. All roads managed by Licensee Team members within the DFA undergo road safety inspections to a defined safety standard.

Current practices and state of measure

Road inspection activities are currently tracked through each Licensee Team member's internal data records. Road inspections are scheduled based on individual company risk ratings that have been assigned to the road. The risk rating is based on environmental factors and potential road safety issues. All roads managed by the Licensee Team members undergo some form of road inspection at least once every 3 years. Based on an analysis of Licensee Team data from April 1, 2003 to March 31, 2004, 99% of road inspections meet the defined safety standards in the DFA.

How are targets established?

The target has been established based on the importance of road safety to the health and well being of both forestry workers and members of the public. Targeting 100% of road inspections to meet defined safety standards is a Licensee Team commitment to ensure safe use of forestry roads in the DFA. Analysis of baseline data shows that a limited number of safety issues on roads within the DFA go uncorrected. Therefore, a target of 100% is an achievable value.

How will this measure be implemented, monitored and reported?

This measure will be monitored and tracked through the Licensee Team member's individual EMS/SOP. Through a query of the tracking system used, Licensee Team members will be able to generate reports that will identify whether or not the target is being achieved across the DFA.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, road inspections were completed, but they were not formally tracked, monitored and reported.

b) Implementation of SFMP: Road inspection activities will be completed and tracked through individual Licensee Team member's data records. Non-conformances with defined safety standards will be entered into incident tracking records where they will be queried on an annual basis. This information will be summarized for the DFA and reported out annually to ensure targets are achieved. This measure will not be implemented through Operational Plans, but will occur through regularly scheduled road inspections.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame, as it is operational in nature. However, it is important to identify what the accepted targets mean to SFM. The percent of road inspections meeting defined safety standards relates primarily to social values of SFM, but can also potentially impact ecological and economic values. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure states a target of 100%, one other scenario should be analysed:

a) What if only 50% of road inspections met defined safety standards?

If only 50% of road inspections met defined safety standards, worker safety, public safety, and water quality could all be reduced. Decreases in worker and public safety could potentially both lead to decreases in overall quality of life in the DFA. If only 50% of road inspections met defined safety standards, this might imply a potential for increased sedimentation into natural water sources. This may negatively affect ecological processes in the DFA and potentially social values related to water quality. Another potential result of only 50% of road inspections meeting safety standards could be an increase in loss time accidents. This could, in turn, negatively affect other economic values within the DFA.

It is anticipated that road inspections will continue in the DFA in the future and that safety standards will be met in order to mitigate the potential negative effects identified in this "what if scenario" analysis.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual improvement will focus on determining the effectiveness of utilizing road inspections to ensure worker and public safety.

4.70 DFA Prescribed Burns that Follow Smoke Management Guidelines

Statement of Measure	Management Objective
9-4.4 The percent of prescribed burns that follow the smoke management guidelines.	Annually, sustain 100% (-10% variance) of prescribed burns that follow the smoke management guidelines.

This measure addresses the following SFM framework parameters:

- **Value:** Social
- **Criterion:** Forest management sustains ongoing opportunities for a range of quality of life benefits.
- **Local indicator:** Maintain worker and public safety within the DFA.

This measure also addresses the following CCFM SFM Criteria and CSA SFM Elements:

- | |
|---|
| <p>Criterion 5 – Multiple Benefits to Society</p> <ul style="list-style-type: none"> • Element 5.3 - Fair Distribution of Benefits and Costs |
|---|

What is this measure?

Members of the Vanderhoof PAG identified smoke management as a public concern and a potential area of improvement for members of the Licensee Team. Smoke produced through forestry management activities occurs during prescribed burning events and is regulated by management guidelines found in the Open Burning Smoke Control Regulation of the *Environmental Management Act 2003*. Under this Regulation, prescribed burning is defined as the knowledgeable application of fire to a specific land area to accomplish pre-determined forest management objectives or other land use objectives. The Regulation provides direction for all aspects of open burning including ways to ensure a good venting index, which will allow smoke to dissipate quickly so as not to present a health or safety risk for forestry workers or members of the public.

Current practices and state of measure

Currently, all members of the Licensee Team operate within the boundaries identified through the Open Burning Smoke Control Regulation. Once burning season begins, Licensee Team members acquire venting index information from government sources (primarily the Environment Canada website) on a daily basis. Venting indices indicate the atmosphere's ability to disperse pollutants and these are reported as good, fair or poor. A venting index of good indicates that conditions are sufficient for burning and this is when scheduled Licensee Team burning activities are initiated.

A review of burning operations conducted by the Licensee Team members between April 1st, 2003 and March 31st, 2004 showed that 98% of these operations occurred in accordance with the Open Burning Smoke Control Regulation.

How are targets established?

Given the results of the current status and the fact that all Licensee Team members operate under the Open Burning Smoke Control Regulation, the target for this measure was set at 100%. A variance of 10% is also applied as smoke control is influenced by local weather patterns, which can often be unpredictable.

How will this measure be implemented, monitored and reported?

To ensure the target for this measure is achieved and reported a data tracking process will be implemented in each Licensee member's woodlands operation to track burning events and adherence to the Open Burning Smoke Control Regulation.

Management Modification and Link to Operational Plans:

a) Status Pre-SFMP: Prior to the development of this SFMP, burning was monitored along with local venting indices to ensure proper burning conditions, but this information was not formally tracked or reported out.

b) Implementation of SFMP: The Licensee Team will develop a tracking system for burning activities that is standardized among signatories to this plan. This tracking system will be queried annually to monitor burning activities and ensure that activities occur in conformance with the Open Burning Smoke Control Regulation. Employees will have this Regulation available for reference and proper conditions will be confirmed prior to commencement of burning activities. Licensee Team data will be summarized and reported out annually to ensure the target is achieved. This measure will not be implemented through Operational Plans, but will be part of a burning plan developed by the individual licensee for monitoring purposes.

Forecasting and probable trends of measure

This measure is not easy to quantifiably forecast over a defined time frame, as it is operational in nature. However, it is important to identify what the accepted targets mean to SFM. The percent of prescribed burns that follow the smoke management guidelines relates primarily to social values of SFM, such as quality of life. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure states a target of 100%, one other scenario should be analysed:

a) What if only 50% of prescribed burns followed smoke management guidelines?

If only 50% of prescribed burns followed smoke management guidelines, it is likely that air pollution within and surrounding the Vanderhoof DFA would increase during burning operations. Increased smoke in the DFA could potentially affect the overall quality of life for residents and visitors to the Vanderhoof area. This could potentially lead to economic losses if tourism and recreation values were affected by smoke accumulations.

It is anticipated that prescribed burns in the DFA will continue to follow smoke management guidelines in the future in order to mitigate the potential negative effects identified in this "what if scenario" analysis.

Measure performance and continual improvement?

Roles and responsibilities are defined in the SFM Implementation Roles and Responsibilities Matrix in Appendix IX. Continual Improvement will focus on determining the effectiveness of utilizing the percent of prescribed burns that follow the smoke management guidelines to ensure worker and public health and safety.

5.0 Adaptive Management

As forest resources change over time, due to ecological processes and human activities, forest managers must be prepared to adapt plans and practices. Adaptive management is necessary as forest managers move toward concurrent sustainability of ecological, economic and social values. Within this SFMP, adaptive management is defined as a learning approach to management that recognizes substantial uncertainties in managing forests, and incorporates experience gained from the results of previous actions into the decision making process. Adaptive management combines management, research monitoring and means of changing practices so that credible information is gained and management activities are modified by experience. Members of the Licensee Team are committed to implementing this SFMP on the basis of adaptive management principles.

The concept of adaptive management relates back to the initial stages of this plan where the Licensee Team and the PAG determined the local indicators and resulting measures of SFM. The measures and their corresponding targets will be the indication of how the Vanderhoof DFA is moving towards SFM. Therefore, selection of indicators and measures is an important process. The measures identified for the DFA need to be measurable, reasonably achievable, relevant to local values and bound to a particular time period so that progress toward targets can be measured. Adaptive management begins after implementation of this plan, where the measures of sustainability within the DFA will begin to be tracked and monitored. At the end of the designated reporting period, SFM measures and their progress will then be analyzed and evaluated in relation to stated targets. Finally, this process leads to adjustment of management activities based on the performance of the identified indicators and measures of SFM. The process of adaptive management is continual and will lead the Vanderhoof Licensee Team toward SFM within the DFA based on the local values identified through the public consultation process.

Applying adaptive management techniques and incorporating local knowledge acquired from management practices in the DFA will be invaluable in aiding the Licensee Team to achieve SFM. Understanding ecosystem function and identification of potential thresholds is also an important part of the adaptive management process that will help the Licensee Team move towards SFM. The overall concept of structured development based on past experience and continual improvement to meet performance goals is the essence of adaptive management. This concept is capable of addressing the complex issues, a multitude of values and a diversity of resource objectives associated with ecosystem management.

5.1 Monitoring

Monitoring of measures involves the collection of appropriate data to verify the achievement of identified targets or forecasted outcomes that determine progress toward the goals of SFM. The overall intent of the monitoring process is to determine whether or not management strategies are meeting the required expectations put forth by identified measures. A monitoring plan will be identified for each unique measure in this SFMP. By means of established Licensee Team EMS frameworks, standard operating procedures and tracking systems, the measures of SFM will be monitored and evaluated against their corresponding standard or target. Measures not monitored through a digital database will be tracked and summarized through paper files in a clear and

concise manner, in order to satisfy audit requirements. During the monitoring process, measures will also be reviewed to ensure they are responsive, adaptive, defensible and publicly acceptable to provide assurances of sustainable forest management within the DFA.

5.2 Analysis/Evaluation and Adjustment

Analysis and evaluation of measures involves a collation, review and if necessary analysis of licensee team data collected during the monitoring phases. An important aspect of the evaluation stage is to relate measure performance to the particular management strategy that was applied in order to achieve specified targets. In forestry operations, the element of control lies with management practices that occur on the ground. If adjustments to practices are required (to effect change in the field), there needs to be a clear relationship between the particular practice being employed and the related effects of this practice on the corresponding measure. Only by clearly understanding the linkage between practice and measure performance can effective adaptive management strategies be implemented.

In response to analysis of forecasted information, there is always the possibility that incorrect assumptions are made with respect to the degree to which forecasted values can be achieved. It is important for data analyzers and interpreters to use objectivity to determine achievements of targets or progress towards SFM. One of the errors that may be introduced with regards to analysis and evaluation is the human element. When evaluating progress toward SFM within the DFA it is important to consider who is analyzing the data, who is interpreting the results and who is providing the review of management strategies. Continual cooperation and collaboration between the PAG and the Licensee Team is essential when adaptive management strategies are proposed to alter the progress of SFM indicators and resulting measures.

The main objective of monitoring, analyzing and evaluating measure performance is to determine whether or not management objectives are being met. In the situation where targets and goals of SFM are not being achieved, a decision to alter management strategies is necessary. One of the difficulties faced by foresters is to assess impacts related to achieving management strategies versus leaving current practices in place. Forests are dynamic systems and sometimes will not respond to practices as predicted in the planning phases. Another challenge is to identify which part of the management practice needs to be altered in order to achieve the goal of SFM. A change in management can affect many facets of a forest ecosystem therefore decisions must be informed, scientifically based and carefully planned.

5.3 Annual Reporting and Communication Strategies

Future communication of the results of measure performance to members of the PAG and to the general public is also an essential element of this SFMP. Each year, beginning in 2006, an annual report that summarizes the overall performance of the measures and targets identified for the Vanderhoof Defined Forest Area will be produced and made publicly available. Along with performance successes, the annual report will also identify any management practices that are not fulfilling prescribed targets. Remedial actions will be developed and proposed within the annual report in order to continually improve and adaptively manage the aspects of SFM that the Licensee Team has committed to achieving. Continual improvement reporting will help to secure the public's trust and confidence in the ability of a resource manager to conduct operations in an integrated, sustainable and economically viable manner.

Along with a summary of the identified measures of sustainability, the annual report will also review the public participation process and will identify how the public's input is considered during decision making in the realm of forest management. Publicly available information about

the SFMP from completed certification audits will also be included in the annual report to provide details regarding the implementation of the plan and the process of CSA certification. Presentation of performance monitoring, continual improvement strategies and potential audit results within the annual report will be communicated using tables, graphs, and maps to aid in data interpretation and to enhance and clarify the public's understanding of SFM.

Throughout the life of the SFMP, Licensee Team members will continue to meet with members of the PAG in order to discuss annual report results, to identify new ideas and values and to incorporate new science into the existing planning regime. Communication of the SFMP to the general public will also be completed throughout the life of the SFMP in accordance with measure 7-2.1 in Section 4.58 of this plan. The Licensee Team will continue to host open houses as required and will utilize the publicly available Planscape newsletter developed through the Community Natural Resource Committee (CNRC) for annual reporting purposes. The SFMP document, along with associated updates and annual reports will also be publicly available in the future through the Canfor website www.canfor.com.

Communication of this plan and the annual report of SFMP performance to members of the PAG and to members of the general public will allow for full disclosure of sustainable forest management activities, including both successes and potential setbacks. Communicating the progress of sustainable forest management through the annual report to all members of the local public will help to ensure that goals are continually set and achieved in accordance with a publicly accepted planning process.

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Appendix I: Sustainable Forest Management Plan Revision Tracking

Vanderhoof Sustainable Forest Management Plan – Revisions

- 1) DRAFT 1.0 October 2004 – Distributed to Vanderhoof Public Advisory Group members for review on October 28, 2004.
- 2) DRAFT 2.0 December 2004 – Distributed to Canfor in December 2004 for internal audit to take place late December 2004, early January 2005
- 3) DRAFT 3.0 January 2005 – Distributed to Vanderhoof Public Advisory Group members on January 29, 2005.
- 4) DRAFT 3.0 February 2005 - Revisions made after PAG distribution and Canfor CSA pre-audit review.
- 5) VERSION 1.0 July 29, 2005 - Revisions made after PWC review and PAG acceptance of these changes.

Appendix II: Vanderhoof SFMP Public Advisory Group Glossary

Vanderhoof Sustainable Forest Management Plan Public Advisory Group Glossary

Updated to June 29, 2004

From CSA definitions, Ministry of Forests "Glossary of Forestry Terms" website, and miscellaneous sources

SFM Framework Definitions

Value: A standard or principle considered valuable or important in life. The three values in the SFM Framework are ecological, economic and social.

Criterion: A category of conditions or processes by which sustainable forest management may be assessed; characterized by a set of related indicators which are monitored periodically to assess change.²

Indicator: A measure of an aspect of the criterion; a quantitative or qualitative variable which can be measured or described and which, when observed periodically, demonstrates trends.

Measure: A set of variables that provides quantitative information about the status/standard established for an indicator.

Target: A specific statement describing a desired future state or condition of measure. Targets should be clearly defined, time-limited and quantified, if possible.

Aboriginal: "Aboriginal peoples of Canada, which includes Indian, Inuit and Métis peoples of Canada" (Constitution Act 1982).

Access Management Plan: An operational plan that shows how road construction, modification and deactivation will be carried out to protect, or mitigate impacts on, known resources or sensitive areas, while maximizing the efficacy of forest resource development.

Access Structures: a structure, including a road, bridge, landing, gravel pit or other similar structure that provides access for forest management such as harvesting.

Adaptive Management: A learning approach to management that recognizes substantial uncertainties in managing forests and incorporates into decisions the experience gained from the results of previous actions. Adaptive management rigorously combines management, research, monitoring, and means of changing practices so that credible information is gained and management activities are modified by experience.

Age Class: Any interval into which the age range of trees, forests, stands, or forest types is divided for classification. Forest inventories commonly group trees into 20-year age classes.

² Santiago Declaration in Montreal Process. 1995. Criteria and indicators for the conservation and sustainable management of natural forests. Canadian Forest Service, Natural Resources Canada. Hull, Ontario. <http://www.mpcf.org/>

Annual Allowable Cut (AAC): The allowable rate of timber harvest from a specified area of land. The Chief Forester sets specific AACs for Timber Supply Areas and Tree Farm Licences in accordance with Section 8 of the *Forest Act*.

Best Management Practice (BMP): A forestry practice or combination of practices determined to be the most practicable means of protecting and conserving forest resources and forest land productivity, now and into the future. BMP are often developed for Forest Roads, Stream Crossings, Riparian Management Zones, handling fuels, lubricants and trash, and others.

Biogeoclimatic Ecosystem Classification (BEC): A hierarchical system of ecosystems that integrates regional, local and chronological factors and combines climatic, vegetation and site factors. The following BEC zones are within the Vanderhoof Forest District:

- ESSF – Engelmann Spruce-Sub Alpine Fir
- SBPS – Sub-Boreal Pine Spruce
- SBS – Sub-Boreal Spruce

Subzones further refine the zones and are based on precipitation and temperature. Examples include: mc – moist, cold; mv – moist, very cold; dk – dry, cool; dw – dry, warm; xv – very dry, very cold.

Each subzone can be further refined by variants. A variant reflects further difference in regional climate.

Also see Site Series.

Biological Richness (species richness): Species presence, distribution, and abundance in a given area.

Biomass: The total dry weight or volume of all or part of a tree.

Carbon Cycle: The storage and cyclic movement of organic and inorganic forms of carbon between the biosphere, lithosphere, hydrosphere, and atmosphere.

Carbon Sink: Forests and other ecosystems that absorb carbon, thereby removing it from the atmosphere and offsetting CO₂ emissions.

Carbon Monitoring Plan: *To be defined.*

Coarse-filter Ecosystem Group: Is the outcome of grouping site series that have relative similarities of their indicator plant communities. This term is also referred to habitat types in the SFM Plan.

Coarse Woody Debris (CWD): Downed woody material of a minimum diameter or greater, either resting on the forest floor or at an angle to the ground of 45 degrees or less. Coarse woody debris consists of sound and rotting logs and branches, and may include stumps when specified. CWD provides habitat for plants, animals and insects, and a source of nutrients for soil development.

Community Natural Resources Committee (CNRC): Established for the Vanderhoof Forest District (and other districts) to provide opportunities for increased public input into the use of forests and other natural resources. The CNRCs are sponsored by forest companies, the Ministry of Sustainable Resource Management, BC Timber Sales and the McGregor Model Forest Association.

Conserve: Keep from harm or damage.

Cultural Feature: Unique or significant places and features of social, cultural or spiritual importance, such as an archaeological site, recreational site or trail, cultural heritage site or trail, historic site, or protected area.

DBH (diameter at breast height): The stem diameter of a tree measured at breast height, 1.3 meters above the ground.

Defined Forest Area (DFA): A specified area of forest, including land and water. The Defined Forest Area for the Vanderhoof Sustainable Forest Management Plan is the Vanderhoof Forest District, excluding private land and woodlots.

Designated Official: A term commonly used to refer to a person designated by name or title to be a designated energy, mines and petroleum resources official, designated environment official, or designated forest official.

Ecosystem: A dynamic complex of plants, animals and micro-organisms and their non-living environment interacting as a functioning unit.

Edge Habitat: Habitat conditions, such as degree of humidity and exposure to light or wind, created at or near the boundary dividing ecosystems, for example, between open areas and adjacent forest.

Effectiveness Monitoring Plan (wildlife): The purpose of an effectiveness monitoring plan is to assess trends in wildlife populations related to their habitat to meet SFMP indicator goal(s). Components of an effectiveness monitoring plan include: goals, current information, conceptual model, indicators & measures, sampling design, analysis, implementation. Those wishing more detailed information on general effectiveness monitoring should review "The strategy and design of effectiveness monitoring program for the Northwest Forrest Plan" USDA General Technical report PNW-GTR-437, January 1999.

Environmentally Sensitive Area (ESA): An area requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, or other natural systems or processes. ESAs for forestry include potentially fragile, unstable soils that may deteriorate unacceptably after forest harvesting, and areas of high value to non-timber resources such as fisheries, wildlife, water, and recreation.

Extension Services: Assistance provided to people to help them learn more about a particular subject from people with specific technical expertise.

Forest and Range Practices Act (FRPA): The *Forest and Range Practices Act* brings in the application of a results-based system for the management of forest and range resources. It will fully replace the *Forest Practices Code of British Columbia Act* by December 2005.

Free-growing Stand: A stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees.

Free-growing Assessment: the determination for whether young trees have attained free-growing status.

Global Ecological Cycles: The complex of self-regulating processes responsible for recycling the Earth's limited supplies of water, carbon, nitrogen, and other life-sustaining elements.

Habitat Types: See Coarse-filter Ecosystem Group.

Inoperable: Lands that are unsuited for timber production now and in the foreseeable future because of a range of factors including: elevation; topography; inaccessible location; low value of timber; small size of timber stands; and steep or unstable soils that cannot be harvested without serious and irreversible damage to the soil or water resources. Inoperable lands may also be designated as parks, wilderness areas, or other uses incompatible with timber production.

Interior Forest: Forest that is far enough away from a natural or harvested edge that the edge does not influence its environmental conditions, such as light intensity, temperature, wind, relative humidity, and snow accumulation and melt.

Known: Used to describe a feature, objective or other thing that is (a) contained in a higher level plan, or (b) otherwise made available by the district manager at least four months before the operational plan is submitted for approval.

Landslide: Includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. For the purpose of the SFMP landslides will be defined as the mass movement of soil or debris covering an area at least 0.10 hectare in size.

Live Tree: Any living tree of a merchantable size. General merchantability standards are 12.5 cm at dbh for pine and 17.5 cm for spruce and fir.

Log (CWD): For the purposes of coarse woody debris, a log is considered as being a minimum of 2 m in length and 7.5 cm in diameter at one end.

Long Run Sustained Yield (LRSY): For any Timber Supply Area, the LRSY is equal to the culmination of mean annual increment weighted by area for all productive and utilizable forest land types in that TSA including all stands classified as Not Satisfactorily Restocked (NSR), Disturbed—Stocking Doubtful and potentially usable non-commercial cover.

Managed Forest Land: Forest land that is being managed under a forest management plan utilizing the science of forestry.

Merchantable Timber: a tree or stand that has attained sufficient size, quality and/or volume to make it suitable for harvesting.

Natural Disturbance: The historic process of fire, insects, wind, landslides, and other natural events in an area not caused by humans.

Natural Disturbance Unit (NDU): Large geographic areas that have similar topography, climate, disturbance dynamics (e.g., fire cycle, patch size), stand development and successional patterns.

NAR: Net Area to Reforest.

NHLB: Non-Harvestable Land Base. The portion of the total area of the Defined Forest Area considered **not** to contribute to, and **not** to be available for, long-term timber supply. The non-harvestable land base includes parks, protected areas, inoperable areas, and other areas and tends to change slightly over time.

Nitrogen Cycle: The movement of nitrogen in its many forms between the hydrosphere, lithosphere, atmosphere and biosphere.

North Central Interior: The land base that includes communities from 100 Mile House to Fort St. John (south to north) and Terrace to Valemount (west to east).

Opportunity THLB: Currently inoperable forests in the Timber Harvesting Land Base that may become operable in the future due to current factors that may be mitigated, such as developed access or a minimum tree diameter to improve the economic feasibility of harvesting.

Over Time: The change from now moving forward in time and includes short-term (≤ 20 years), mid-term (>20 years and less than one rotation ≥ 100 years), and long-term ($> one$ rotation).

Patch: A particular unit with identifiable boundaries and different vegetation from its surroundings.

Peak Flow Index (PFI): Is an index of the maximum water flow rate that occurs within a specified period of time, usually on an annual or event basis. In the interior of British Columbia, peak flows occur as the snow pack melts in the spring.

Permanent Access: A structure, including a road, bridge, landing, gravel pit or other similar structure, that provides access for timber harvesting and is shown on a forest development plan, access management plan, logging plan, road permit or silviculture prescription / site plan as remaining operational after timber harvesting activities on the area are complete.

Plant Association: A community of plants. A plant association is generally comprised of, at least the three most abundant species found growing on a site, with at least one representative from the tree layer and one or more representatives from either the shrub, herb, or bryophyte layers.

Plant Diversity Index: A diversity index is a mathematical measure of species diversity in a community. Diversity indices provide more information about community composition than simply species richness (i.e. the number of species present); they also take the relative abundance of different species into account. Diversity indices provide important information about rarity and commonness of species in a community.

Predictive Ecosystem Mapping (PEM): A computer-GIS, and knowledge-based method that divides landscapes into ecologically oriented map units for management purposes. PEM is a new and evolving inventory approach designed to use available spatial data and knowledge of ecological-landscape relationships to automate the computer generation of ecosystem maps.

Productive Capability: The current and future ability of forest ecosystems to produce biomass.

Productivity: The natural ability of a forest ecosystem to capture energy, support life forms, and produce goods and services.

Public: The people as a whole within a defined area (i.e. community, forest district). At its broadest sense public means everyone anyone in the world and to narrowest sense public might be considered as the people living on your street.

Regeneration delay: the time allowed in a prescription between the start of harvesting in the area and the earliest date by which the prescription requires a minimum number of acceptable well-spaced trees per hectare to be growing in that area. There is a maximum permissible time allowed and comes from standards developed and/or approved by government.

Resident: A member of the public who has resided within a defined area (i.e. community, forest district, defined forest area) for more than 6 months.

Riparian: An area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas.

Riparian Habitat: Vegetation growing close to a watercourse, lake, swamp, or spring that is generally critical for wildlife cover, fish food organisms, stream nutrients and large organic debris, and for streambank stability.

Riparian Management Area (RMA): Defined in the Forest Practices Code of British Columbia Act Operational Planning Regulation as an area, of width determined in accordance with Part 10 or the regulation, that is adjacent to a stream, wetland or lake with a riparian class of L2, L3 or L4; and, consists of a riparian management zone and, depending on the riparian class of the stream, wetland or lake, a riparian reserve zone. See Figure 1.

Riparian Management Zone (RMZ): Defined in the Forest Practices Code of British Columbia Act Operational Planning Regulation as that portion of the riparian management area that is outside of any riparian reserve zone or if there is no riparian zone, that area located adjacent to a stream, wetland or lake of a width determined in accordance with Part 10 or the regulation. See Figure 1.

Riparian Reserve Zone (RRZ): Defined in the Forest Practices Code of British Columbia Act Operational Planning Regulation as that portion, if any, of the riparian management area or lakeshore management area located adjacent to a stream, wetland or lake of a width determined in accordance with Part 10 of the regulation. See Figure 1.

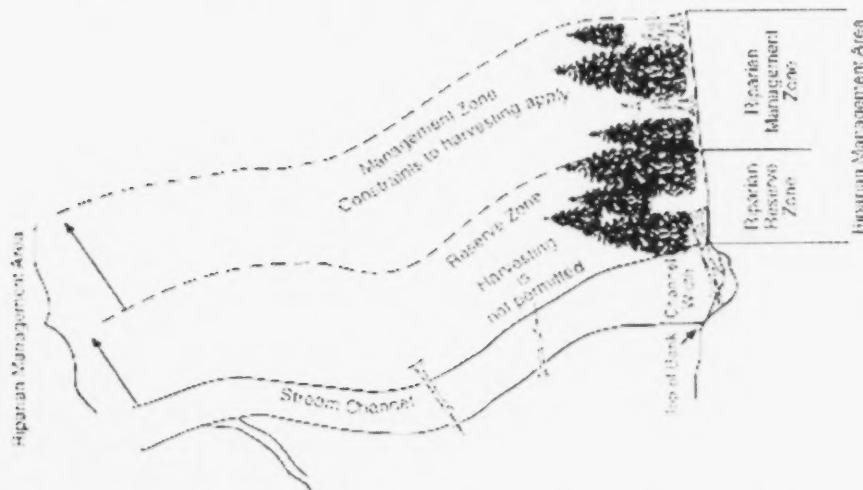


Figure 1. Riparian management area showing a management zone and a reserve zone. Source: Riparian Management Area Guidebook 1995.

Road Deactivation: measures taken to stabilize roads and logging trails during periods of inactivity, including the control of drainage, the removal of sidecast where necessary, and the re-establishment of vegetation for permanent deactivation. Road deactivation ranges from temporary to permanent.

Road: A path or way with a specifically prepared surface for use by vehicles.

Road Permit: An agreement entered into under Part 8 of the Forest Act to allow for the construction or modification of a forest road to facilitate access to timber planned for harvest.

Stakeholder: A person with an interest or concern with resource management within a defined area (i.e. community, forest district, defined forest area).

Seral Stage: Any stage of development of an ecosystem, from a disturbed, non-vegetated state (early seral) to a mature plant community (late seral).

Shannon-Wiener Index: The Shannon-Wiener index for a plant community is derived using the following equation:

$$H = - \sum_{i=1}^S (p_i)(\ln p_i)$$

where: H = index of species diversity
 S = number of species
 p_i = proportion of total sample belonging to the i th species
 $\ln$ = natural log³

Due to its logarithmic nature, the Shannon-Wiener Index is sensitive to uncommon plant species and less sensitive to very common species. More value is given to the presence of each species than is given to the abundance of each species.

Simpson's Index: The Simpson's index value range between 0 and 1. The closer to 0 the value is, the more diverse the plant species is. If only one plant species is found then the Simpson's index would be 1. Simpson's index is calculated as follows:

$$SI = \sum_{i=1}^S p_i^2$$

where: SI = Simpson's index of plant species diversity
 S = number of plant species
 p_i = proportion of total sample belonging to the i th plant species

Site Index: The height of a tree at 50 years of age (age is measured at 1.3m above the ground) in managed forest stands site index may be predicted using either (1) the biogeoclimatic ecosystem classification for the site or (2) the Site Index Curve which uses the height and age of sample trees over 30 years old.

Site Plan: Replaces the silviculture prescription and is created and kept on file by the licensee and does not need Ministry of Forests approval. The site plan identifies the appropriate standards for:

- Stand-level biodiversity and permanent access structures at the cutblock level; and
- Soil disturbance limits, stocking requirements, regeneration date, and free-growing date at the standards unit level.

Site Productivity: The site capacity of the land to produce vegetative cover (biomass).

Site Series: A landscape position consisting of a unique combination of soil edaphic features, primarily soil nutrient and moisture regimes within a biogeoclimatic subzone or variant. Soil nutrient and moisture regimes define a site series, which can produce various plant associations (see definition of "plant association"). In the BEC system, site series is identified as a number (e.g., 01,02, 03, ...).

Smoke Management Guidelines: A set of guidelines developed to be in compliance with the Opening Burning Smoke Control regulation (April 1993). See

http://www.weatheroffice.pyr.ec.gc.ca/wxhealth/smoke/default_e.html for more details.

³ Any base of logarithms can be used for this index, as they are convertible to one another by a constant multiplier (Krebs, 1989).

Soil Disturbance: Disturbance caused by a forest practice on an area. This includes areas occupied by excavated or bladed trails of a temporary nature, areas occupied by corduroyed trails, compacted areas, and areas of dispersed disturbance.

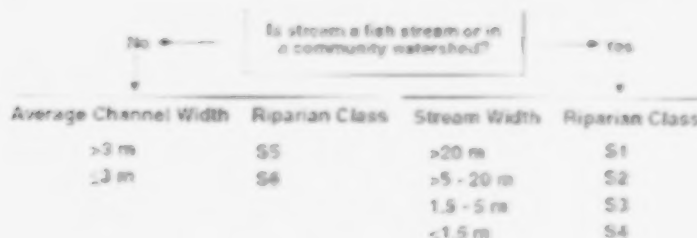
Soil Moisture Regime: The amount of moisture in the soil. Generally shown on a scale going from **xeric** (being deficient in moisture - dry) to **mesic** (characterized by moderate or a well-balanced supply of moisture) to **hydric** (characterized by excessive moisture).

Species at Risk Status Definitions:

- Globally:** **Secure** – Common; widespread and abundant.
 Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
 Vulnerable – At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
 Imperiled – At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines or other factors.
 Critically Imperiled – At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
- Provincially:** **Secure** – Common, widespread and abundant in the province.
 Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
 Vulnerable – Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
 Imperiled – Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.
 Critically Imperiled – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.
- COSEWIC:** **Not at Risk** – A species that has been evaluated and found to be not at risk of extinction given the current circumstances.
 Special Concern – A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
 Threatened – A wildlife species likely to become endangered if limiting factors are not reversed.
 Endangered – A wildlife species facing imminent extirpation or extinction.
 Extirpated – A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
 Extinct – A wildlife species that no longer exists.
 Wildlife Species – A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.

Stocking Standard: The required range of healthy, well-spaced, acceptable trees growing on an area to achieve a free-growing stand.

Stream Class: A stream is a watercourse, having an alluvial sediment bed, formed when water flows on a perennial or intermittent basis between continual definable streambanks. There are six stream riparian classes designated S1 to S6 that are based on presence of fish, occurrence in a community watershed and average channel width. S1 to S4 streams are fish streams or streams in a community watershed. S5 and S6 streams are not fish streams and are not within a community watershed.



Stumpage: The fee that individuals and firms are required to pay the government for harvesting Crown timber in British Columbia. Stumpage is determined through a complex appraisal of each stand or area of trees that will be harvested for a given timber mark. A stumpage rate (\$ per m³) is determined and applied to the volume of timber that is cut, and the individual or firm is invoiced by the Ministry of Forests.

Sustainable Forest Management (SFM): The balanced, concurrent sustainability of forestry-related ecological, social, and economic values for a defined area over a defined time frame.

SFMP: Sustainable forest management plan.

Snag: A standing dead tree, or part of a dead tree, found in various stages of decay—from recently dead to very decomposed.

Timber Harvesting Land Base (THLB): The portion of the total area of the Defined Forest Area considered to contribute to, and to be available for, long-term timber supply. The harvesting land base is defined by reducing the total land base according to specified management assumptions and tends to change slightly over time.

Visual Landscape Inventory: the identification, classification, and recording of the location and quality of visual resources and values.

Visual Quality Objective (VQO): A resource management objective established by the district manager or contained in a higher level plan that reflects the desired level of visual quality based on the physical characteristics and social concern for the area. Five categories of VQO are commonly used:

Preservation – No visible timber harvesting activity. **Retention** – Timber harvesting activities are not visually evident. **Partial Retention** – Activities are visual, but remain subordinate. **Modification** – Activities are visually dominant, but have characteristics that appear natural. **Maximum Modification** – Activities are dominant and out of scale, but appear natural in the background.

Visually Sensitive Areas: Viewsheds that are visible from communities, public use areas, and travel corridors, including roadways and waterways, and any other viewpoint so identified through referral or planning processes.

Unmerchantable: of a tree or stand that has not attained sufficient size, quality and/or volume to make it suitable for harvesting.

Unsalvaged Losses: the volume of timber destroyed by natural causes such as fire, insect, disease or blowdown and not harvested, including the timber actually killed plus any residual volume rendered non-merchantable.

Utilization Standards: the dimensions (stump height, top diameter, base diameter, and length) and quality of trees that must be cut and removed from Crown land during harvesting operations. For detailed standards see the Provincial Logging Residue and Waste Measurement Procedures Manual (July 1, 2002 & May 1, 2004 – Draft).

Waste: the volume of timber left on the harvested area that should have been removed in accordance with the minimum utilization standards in the cutting authority. It forms part of the allowable annual cut for cut-control purposes. For detailed standards see the Provincial Logging Residue and Waste Measurement Procedures Manual (July 1, 2002 & May 1, 2004 – Draft).

Water Cycle (also known as the hydrologic cycle): The journey water takes as it circulates from the land to the sky and back again.

Appendix III: The Public Advisory Group Terms of Reference

VANDERHOOF SUSTAINABLE FOREST MANAGEMENT PLAN

Public Advisory Group

**TERMS OF REFERENCE
as of June 8, 2005**

Prepared by:
Management Plus Communications Ltd.
(250) 305-1003

1. Background

1.1 Purpose of Sustainable Forest Management

The objective of sustainable forest management (SFM) is to concurrently balance the sustainability of forestry-related ecological, social and economic values for a defined area over a defined timeframe. SFM is about being economically sustainable on public land, respecting the social needs of the public, and sustaining viable ecosystems.

The SFM Plan will be developed for the Vanderhoof Forest District and will incorporate these principles of sustainable forest management. One of the goals of the Vanderhoof SFM Plan is to provide members of the Licensee Team the opportunity to obtain Canadian Standards Association (CSA) certification where appropriate.

1.2 Licensee Team

The Licensee Team for the Vanderhoof SFM Plan consists of representatives from Canadian Forest Products Ltd. (Canfor), Lakeland Mills Ltd., BC Timber Sales (Stuart-Nechako Business Area) and L&M Lumber Ltd.

1.3 Defined Forest Area

The Defined Forest Area (DFA) for the Sustainable Forest Management Plan is the Vanderhoof Forest District, excluding private land and woodlots. The DFA boundaries are shown in the map provided in Figure 1 in the SFMP text.

1.4 Public Advisory Group

The Public Advisory Group (PAG) for the Vanderhoof Sustainable Forest Management Plan is comprised of a range of individuals representing the interests listed in section 3.1.1. As outlined in these terms of reference, the PAG will specifically work under the Defined Goals (section 2) as an open, transparent and accountable process.

1.5 Linkage of Public Advisory Group with the Community Natural Resources Committee

The Public Advisory Group is a sub-committee of the Community Natural Resources Committee. Some individuals may serve on both committees, but there will be no decision-making by the PAG or CNRC for each other.

2. Defined Goals

The goal of the Vanderhoof Sustainable Forest Management Plan is to demonstrate commitment to sustainable forest management principles for the Vanderhoof Forest District. The development and implementation of the SFM Plan will be the responsibility of the Licensee Team, which will work with a Public Advisory Group.

The Public Advisory Group will have the opportunity to work with the Licensee Team to:

- a. Review the nine criteria identified in the SFM Framework and identify interests for each.
- b. Identify an indicator for each criterion.
- c. Identify measures and targets for each indicator.
- d. Develop alternative strategies to be assessed.
- e. Assess alternative strategies and select the preferred one.
- f. Review the SFM plan.
- g. Design monitoring programs, evaluate results, and recommend improvements.
- h. Discuss and resolve any issues relevant to SFM on the DFA.

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The Licensee Team and the PAG shall ensure that the indicators, measures and targets are consistent with relevant government legislation, regulations and policies.

The Licensee Team and the PAG recognize and agree that Aboriginal participation in the public participation process will not prejudice Aboriginal and Treaty rights.

The Licensee Team will attempt to resolve all strategic level issues (including those recognized and agreed to by the PAG) relative to the SFM, and identify appropriate processes and contacts for specific operational issues.

3. Roles and Responsibilities

3.1 Public Advisory Group

3.1.1 Membership Structure

The Public Advisory Group reflects a range of interests in the DFA, including DFA-related workers. In addition to Aboriginals, the PAG consists of members representing the following interests:

- a. Agriculture (includes farming and ranching)
- b. Berry and mushroom picking
- c. Commercial recreation and tourism (includes guide outfitters)
- d. Environment and conservation
- e. Forest contractors
- f. History and archaeology
- g. Mill workers
- h. Mining, oil and gas
- i. Non-commercial recreation and tourism (includes resident hunting and fishing)
- j. Residents of the Defined Forest Area (Vanderhoof Forest District)
- k. Retirees
- l. Rural communities
- m. Small community business
- n. Trapping
- o. Woodlots

3.1.2 Selection of PAG Members

The Licensee Team initially recruited potential members from the above interests through mailed invitations to individuals on the comprehensive stakeholder database compiled for the Community Natural Resources Committee. As well, they held a public open house and advertised in local newspapers to generate interest in the PAG.

Based on the above:

- a. The potential membership was reviewed at the initial PAG meetings by members of the public and the Licensee Team. Once the PAG was established, members of the PAG and the Licensee Team could recommend changes in PAG structure and potential members.
- b. The Licensee Team, in consultation with the PAG, confirms appointments, replacement, and removal of PAG members.
- c. The PAG will aim to be comprised of individuals representing an equitable distribution of the interests identified in 3.1.1.
- d. The long term objective will be to target the size of the PAG, excluding Aboriginals, to 15 members

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- e. Existing PAG members will be grandparented into the ongoing PAG and new members will only be recruited where interests identified in 3.1.1 are not represented in the PAG.
- f. The list of interests and/or members may be revised based on input from the PAG and with the agreement of the Licensee Team.
- g. To provide continuity, it is hoped that PAG members will serve for a minimum of two years. They may be replaced if their term is complete or if they are not meeting the Terms of Reference.

3.1.3 Role of PAG Members

The role of PAG members is to:

- a. Provide input related to the Defined Goals (defined in Section 2).
- b. Attend meetings regularly having reviewed meeting materials prior to meeting.
- c. Assume responsibility towards reaching consensus on recommendations to the Licensee Team.

Based on consultation with the PAG, members may be replaced and/or removed if more than two consecutive meetings are missed without a valid reason (i.e. Absent with regrets) and without notifying a Licensee Team representative if they cannot attend a meeting. It is recognized that PAG members may miss some meetings due to the nature of their work or other activities. If a member is unable to attend a particular PAG meeting, he/she is encouraged to provide input for discussion about an agenda item to the PAG, or contact another member, before the meeting.

3.1.4 Conflict of Interest

The PAG recognizes that a conflict of interest could occur if there is a potential for a member to personally and directly benefit from specific recommendations from the PAG. Therefore, if a member has a perceived or real conflict of interest that could result in a potential exclusive personal economic benefit in relation to his or her input to the Defined Goals, that member, other PAG members or a member of the Licensee Team must state the potential conflict. The PAG and the Licensee Team will then decide on what actions are needed.

Potential actions could include asking the member to:

- a. Serve as an observer for the relevant specific issue(s) and recommendation(s);
- b. Take a leave from the PAG (length of term to be defined); or
- c. Carry on with normal participation.

3.2 Role of Licensee Team

The role of the Licensee Team is to:

- a. Provide information to the PAG as related to the Defined Goals.
- b. Ensure the circulation of draft and final meeting summaries, dates and agendas.
- c. Maintain a current listing of outstanding "parking lot" items as agreed to in PAG meetings.
- d. Review and consider the recommendations of the PAG.
- e. Make decisions regarding sustainable forest management and certification.
- f. Demonstrate that all input is considered and responses are provided.
- g. Provide the necessary human, physical, financial, information and technological resources, as reasonable.
- h. Technological resources and expertise will be provided by the Licensee Team, and where required by guest speakers as determined by the Licensee Team with input from the PAG.
- i. Notify inactive PAG members regarding their pending replacement or removal.
- j. Not take part in reaching consensus or decision-making by the PAG.

3.3 Advisors

Advisors will be invited by the Licensee Team, as required, to provide technical information and advice to the PAG. These advisors could be from government agencies, professional organizations, academia, consulting firms or other sources.

3.3.1 Role of Advisors

The role of advisors is to:

- a. Provide and/or clarify technical or legal information and participate in discussions as requested.
- b. Not take part in reaching consensus or decision-making by the PAG.

3.4 Observers

The public is welcome to observe PAG meetings but:

- a. May not participate in discussions unless agreed to by the PAG, facilitator and Licensee Team.
- b. May not take part in reaching consensus or decision-making by the PAG.

3.5 Facilitator

The role of the PAG facilitator is to:

- a. Ensure that PAG meetings address the agreed-upon agenda topics.
- b. Manage and implement the Terms of Reference, including the appropriate participation of all members of the PAG and Licensee Team, in addition to advisors and observers.
- c. Regularly review and prioritize with the PAG and Licensee Team outstanding "parking lot" items.
- d. Start and end all meetings at the times stated in the agenda.
- e. Enable equitable opportunity by all PAG members to participate in the meetings.
- f. Work to clarify interests and issues and help the PAG build recommendations. Ensure past consensus based decisions are respected and supported.
- g. Not take part in reaching consensus or decision-making by the PAG.

4. Timelines

The following summarizes key dates for development of the Sustainable Forest Management Plan.

- | | |
|---|----------------|
| 1. Invitations sent to potential participants and newspaper ads printed | Complete |
| 2. Public Open House | Complete |
| 3. Initial Public Advisory Group meeting | Complete |
| 4. Complete input by PAG | Complete |
| 5. Review of SFMP by PAG | Complete |
| 6. CSA audit (for Canfor) | Feb./Mar. 2005 |

Following the completion of the SFMP, it is estimated that the PAG meeting schedule would include 2-3 meetings per year beginning in 2005 and potentially include:

- | | |
|--|-------|
| 1. Review CSA Audit (Canfor) (PAG Meeting #1) | April |
| 2. Review annual report and input on SFMP (optional) | Fall |
| 3. Future CSA audits/Parking Lot Items (optional) | Fall |

5. Operating Rules

5.1 Ground Rules

All participants in this process agree to work under the following ground rules:

- a. To be on time for PAG meetings.
- b. To be respectful of other participants.

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- c. To avoid interrupting a speaker or making personal attacks.
- d. To speak to the topic.
- e. To try to understand each others' point of view.

Participants will direct questions and comments to the facilitator, who will recognize the speaking order as participants raise their hand to speak. Everyone will be able to speak to a topic once before participants are offered a second opportunity.

5.2 Meeting Agenda and Dates

The meeting location and schedule may change if agreed to by the PAG and Licensee Team.

5.2.1 Meeting Agenda and Location

- a. Input on upcoming meeting agendas will be obtained during each PAG meeting.
- b. The Licensee Team will finalize and ensure the distribution of meeting agendas, meeting summaries and pre-meeting material to PAG members. The agenda will include proposed objectives for the meeting.
- c. The suggested meeting location is the Village Inn in Vanderhoof.

5.2.2 Meeting Schedule

- a. Meeting dates will be confirmed jointly between the Licensee Team and the PAG.
- b. Meeting frequency will be initially every two to three weeks.
- c. Timing of meetings will be evenings, from 5 pm to 9 pm, with dinner provided.
- d. The preferred day is Thursday (recognizing that the first Thursday of the month does not work for one PAG member).

6. Communication

6.1 Internal to the PAG

- a. The Licensee Team will ensure the meeting summary is distributed to PAG members within two weeks of that meeting.
- b. The Licensee Team will ensure draft meeting agendas are circulated to PAG members at least one week prior to the meeting.
- c. The Licensee Team will strive to provide background and technical information to the PAG as related to the PAG's defined role, including information related to the DFA and SFM requirements.
- d. The Licensee Team will respond to all recommendations from the PAG, and will identify how they have been addressed or their rationale for why they were not addressed.

6.2 External to the PAG

- a. The Licensee Team will provide an annual report to the PAG each fall and make it available to interested parties.
- b. When speaking to the media and external parties about the SFM Plan and PAG process, members of the PAG and the Licensee Team will avoid being disrespectful to others.
- c. The PAG may draft and approve a media release on its activities and/or may invite the media to attend meetings as observers.

6.3 Internal to the Licensee Team

- a. Input from the PAG will be reported at meetings of the Licensee Team.
- b. The Licensee Team will provide feedback on how the PAG recommendations were considered, or the rationale for why they were not.

- c. The Licensee Team will appoint a lead representative for each PAG meeting.

7. Meeting Expenses

- a. Mileage to and from PAG meetings for those members traveling more than 50 kilometers each way to the meeting site will be reimbursed at \$0.41 per kilometer. PAG members traveling from outside the Vanderhoof Forest District must obtain approval for travel expenses from the Licensee Team before the meeting.
- b. Overnight accommodation for those traveling to PAG meetings will be reimbursed if pre-approved by the Licensee Team. As a general principle, accommodation should be economical.
- c. Expense forms with copies of receipts for the above must be submitted to the facilitator within two weeks of the PAG meeting.

8. Decision Making and Methodology

The PAG agrees to work by consensus, defined as "no member having substantial disagreement on an issue and is willing to proceed to the next step."

- a. Every effort shall be made to achieve consensus, but if this is impossible then the person(s) with the outstanding issue shall offer solutions or options for resolution.
- b. Consensus may consist of agreement on a summary of the different perspectives and those perspectives will be forwarded to the Licensee Team for a decision.
- c. Decisions on specific issues will be considered interim consensus, unless agreed otherwise, until there is consensus on the full set of recommendations.

9. Dispute Resolution Mechanism

9.1 Process Issues

Process issues will be resolved by the facilitator.

9.2 Technical Issues

- a. The PAG members will work to identify the underlying issues and work towards a solution in a positive, friendly environment.
- b. The members will seek compromise, alternatives and clarification of information needed.
- c. The members will commit to arriving at the best solution possible.
- d. If no consensus solution can be reached, then the outstanding issues will be summarized by the PAG and forwarded to the Licensee Team for a decision and rational.

10. Review and Revisions

The Terms of Reference will be reviewed annually after adoption, or earlier based on consensus of the PAG and the Licensee Team to review.

Approved:

Public Advisory Group

Date: June 8, 2005

Licensee Team

Date: June 8, 2005

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Appendix IV: List of Inventories Completed in the Defined Forest Area

Appendix V: Vanderhoof SFMP PAG Multi Criteria Analysis Results

Preliminary Assessment of Multi-Criteria Analysis Results
Vanderhoof PAG
June 24, 2004

Submitted to the Vanderhoof Licensee Team

Nicole Robinson
Canfor, SFM Framework Team

Introduction and Overview

The following represents a preliminary assessment and interpretation of the Multi-Criteria Analysis (MCA) exercise conducted with the Vanderhoof Public Advisory Group (PAG) on June 9, 2004 and June 18, 2004. The intent of the MCA was to quantify the priority of SFM values by the PAG.

The raw data submitted by participating PAG members were compiled by Darryl Bokvist of Canfor Ltd. Plateau, and are summarized in the file: Vanderhoof MCA jun24.2004.xls. In total, 19 PAG members submitted complete responses to the questions posed as part of the Vanderhoof PAG MCA. The summary of data and interpretations are based on the charts found in the same file.

The questions posed to the PAG members were as follows:

- 1. Rank the criteria in order of priority for you, 1 being the highest priority and 9 the lowest.*
- 2. You have a total of 30 points. Distribute them as you see fit to the criteria. You can allocate all of your points to a single criteria, distribute them evenly across the criteria or weight the criteria by putting more points to one than the other. Once distributed, the total point total must equal 30.*
- 3. In your opinion, which criteria are most at risk of not being achieved given your perception of the current management scenario? Rank the criteria with 1 being the most at risk and 9 the least.*
- 4. Which criteria are you least willing to take risk on? You have a total of 30 points, distribute them as you see fit to the criteria in terms of your willingness to accept risk of not achieving the criteria (high points = less acceptance). You can allocate all of your points to a single criteria, distribute them evenly across the criteria or weight the criteria by putting more points to one than the other. Once distributed, the point total must equal 30.*

This preliminary analysis contains three sections. Section 1 summarizes and interprets the results from the Prioritization exercise (questions 1 and 2). Section 2 summarizes and interprets the results from the Risk exercise (questions 3 and 4). Section 3 discusses the utility of this information in guiding Scenario Design as the next step in the sustainable forest management planning process for the Vanderhoof Defined Forest Area (DFA).

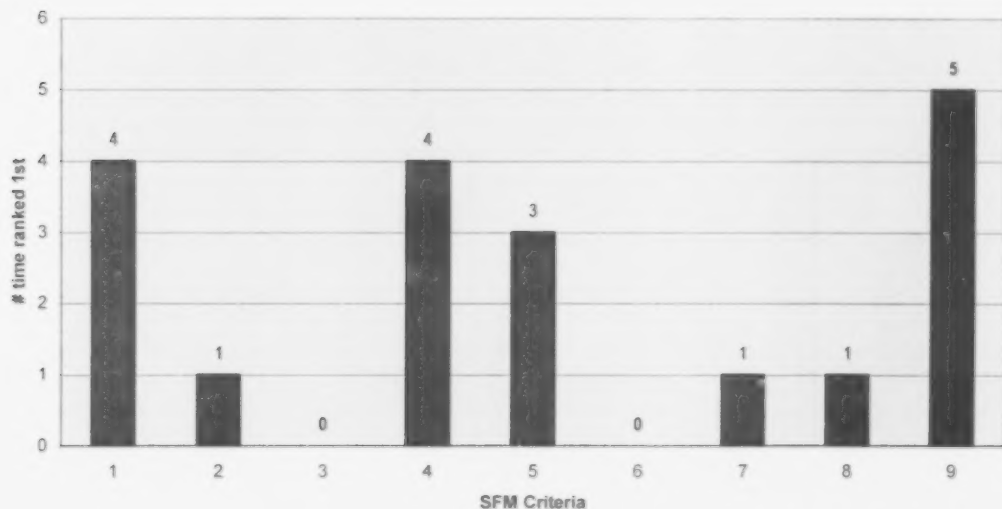
The intent of the questions was to solicit initial PAG member preferences without dealing with potential tradeoffs amongst the criteria. Although responses were individual in nature, the compilation of all of the responses across the PAG has been used to guide input into scenario design.

SECTION 1 - ESTABLISHING STAKEHOLDER PRIORITIES

a. Top Ranking of SFM Criteria

Results - The intent of this exercise was to determine which SFM Criterion was considered by the overall PAG to be the most important of the nine. The graph below shows that Quality of Life (C9) was ranked first with Biological Richness (C1) and Timber Economics (C4) ranked a close second in a tie. Grouped together, the economic values of Timber and Non-timber Benefits (C4 & C5) ranked the highest overall. Carbon (C3) and Economic Resilience (C6) were not ranked once as a top priority. All other Criteria were ranked at least once as top priority.

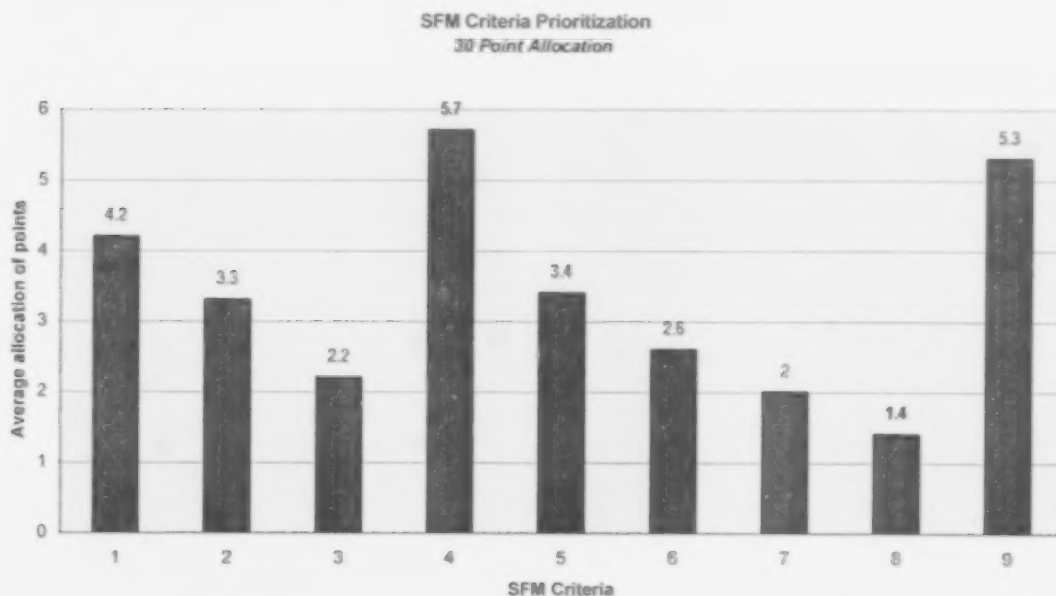
Criteria Ranking - Top Priority



Interpretation - More than half of the participating PAG members selected C9, C1 or C4 as top -representing each of the Social, Ecological and Economic values. Just under half selected other criteria as top priority revealing a fairly widely dispersed set of top resource priorities within the group. Neither Carbon (C3) nor Economic Resilience (C6) was selected once as a priority.

b. Prioritization of SFM Criteria – 30 Point Allocation

Results – The intent of this exercise was to have PAG members prioritize SFM Criteria in relation to one another by allocating 30 points across the nine criteria. The results show that Timber Economic Benefits (C4) and Quality of Life (C9) rank highest as the most important values overall in relation to the other SFM Criteria. Biological Richness (C1) was allocated the third highest number of points compared to the remaining criteria. Carbon (C3), Decision Making (C7) and First Nations (C8) were allocated the least number of points relative to the other SFM Criteria.



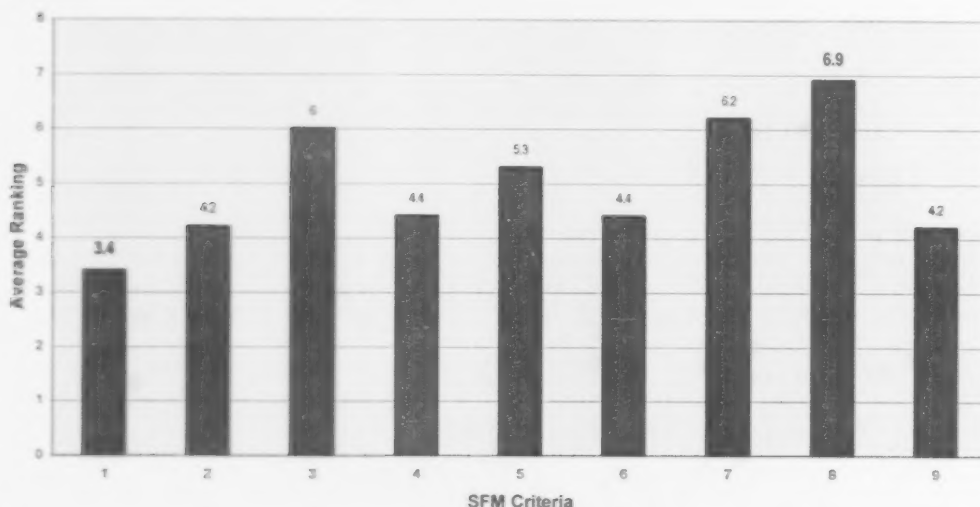
Interpretation - Of note here is that all SFM Criteria were allocated some points by the group indicating a preference to sustain the full range of SFM Values within the DFA. The values of points allocated of the top 3 criteria as a group were distinct in terms of their ranking relative to each other resulting in Timber Benefits, Quality of Life and Biological Richness standing out as the most important. Non-timber Economic Benefits (C5) and Ecosystem Productivity (C2) ranked slightly higher than the bottom four, though all were given points. It may be of interest to note that these outcomes result in part from some PAG members pooling their points in only one, two or three of the criteria (e.g. one person allocated all 30 points to only one of the criteria). The results are similar to the top ranking of criteria with C4, C9, and C1 as the top three values. Although the top ranking shows C5 to be of high importance, the Point Allocation demonstrates the Ecosystem Productivity (C2) has almost the same level of importance. The Point Allocation for priority also provides some clearer results in terms of relative order of importance of the remaining SFM Criteria.

c. Average Ranking of Criteria

Results – The graph below shows the Average Ranking of each SFM Criteria. The value of Average Ranking reflects the average that each Criterion was ranked by all participants (i.e.

how many times it was ranked 1st, 2nd to 9th). The lower the value, the higher in importance the SFM value. The results show that Biological Richness received the overall highest average ranking, with Ecosystem Productivity (C2) and Quality of Life (C9) tied in second place and Timber Economic Benefits (C4) and Economic Resilience (C6) tied for third. First Nations (C8), Decision Making (C7) and Carbon (C5) had the lowest average ranking.

Average Ranking of Criteria
(lower average number = higher ranking)



Interpretation – Though Quality of Life (C9) received a higher Top Ranking than Biological Richness (C1), the Average Ranking scores C1 over C9. Looking at the pooled responses for Top 1 & 2 rankings and Bottom 8 & 9 rankings, we can see that the ranking for C9 was more polarized than C1. This means that though many respondents ranked C9 as Top 1 & 2 for importance (8/19), several ranked it as bottom as well (4/19) where as only one person ranked C1 as bottom.

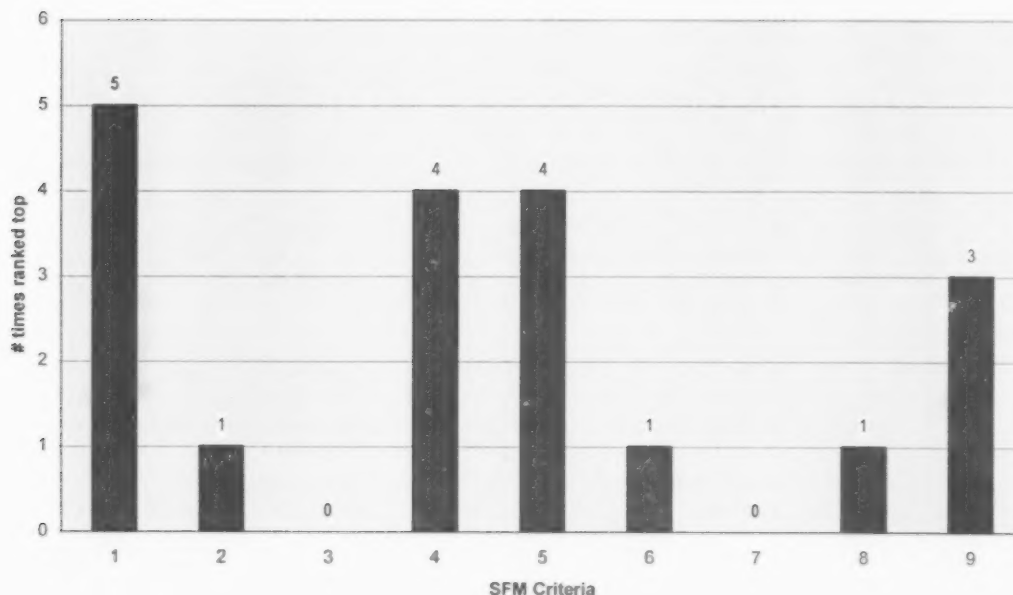
The Average Ranking provides more insight into the relative importance of Ecosystem Productivity (C2). The Top Ranking exercise ranked it as relatively low, but both the Point Allocation exercise and the Average Top Ranking indicate that it is fairly high in importance. However, it is not possible to distinguish between C4, C6, C2 and C9 in terms of their relative order of importance.

SECTION 2 - ESTABLISHING TOLERANCE TO RISK

a. Top Ranking of SFM Criteria Most at Risk (of not being sustained)

Results - The intent of this exercise was to determine which SFM Criterion was considered to be the most at risk of not being met. The Criterion for Biological Richness (C1) was ranked the highest with Timber Economics (C4) and Non-timber Economics benefits tied at a close second and Quality of Life (C9) ranking third. It may be interesting to note that 42% of the responses collectively ranked Economic Benefits (timber and non-timber) the highest at risk of not being sustained under current management.

Ranking of Criterion considered most at risk of not being sustained

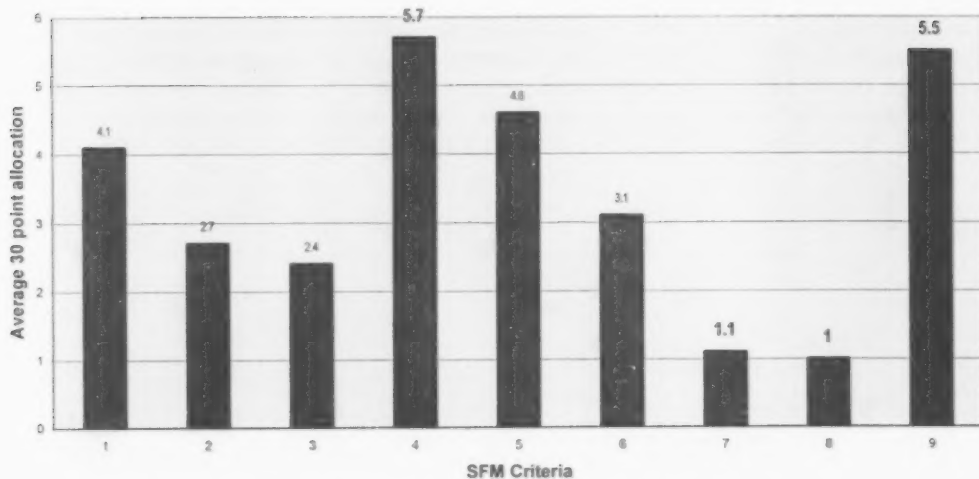


Interpretation - Though Biological Richness was ranked highest, overall, economic values were given the highest level of risk of not being sustained under current management practices or regulations, although the top 3 rankings included each of the Ecological, Economic and Social values. Neither Carbon (C3) nor Decision Making (C7) were ranked top once.

b. SFM Values Least willing to put at Risk - Allocation of Points

Results - The intent of this exercise was to rank the SFM Criteria according to which ones PAG members are least willing to put at risk of not being sustained. Timber Economic Benefits (C4) and Quality of Life (C9) were strongly ranked as the top values not to be put at risk (by management strategies), followed by Non-timber Economic Values (C5) and Biological Richness (C1). The public-stakeholder type criteria of Decision-making (C7) and First Nations (C8) were the values allocated the lowest level of risk.

Prioritization of SFM Values least willing to take risk on



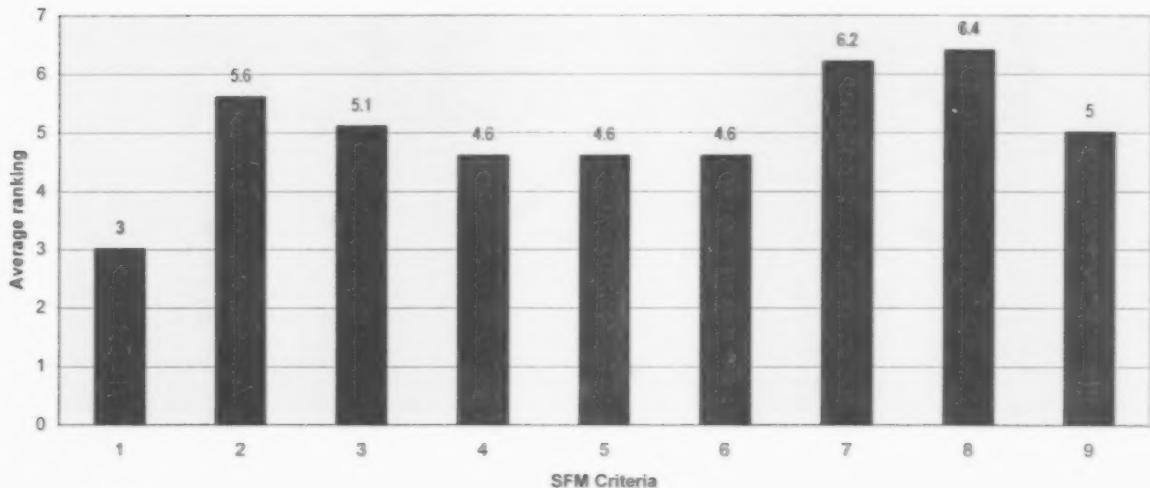
Interpretation – The results of this exercise reveal that a significant number of PAG members appear adverse to risking Timber Economic (C4) and Quality of Life (C9) values under a sustainability scenario. Tolerance to risk for Non-timber Economics (C4) and Biological Richness was low to medium for the values of Economic Resilience (C6), Productivity (C2), and Carbon (C3) with Decision Making (C7) and First Nations (C8) values at a medium to high level of tolerance for risk relative to other values.

The sequence of ranked criteria appear consistent with the top priority responses, with the same two criteria receiving the highest average rankings overall (Quality of Life and Timber Economic Benefits). These results may be similarly affected as priority allocation with a few individual PAG members pooling their points in 1, 2 or 3 specific criteria.

c. Average Ranking

Results - The graph below shows the Average Ranking of Risk for each SFM Criteria. The value of Average Ranking reflects the average that each Criterion was ranked by all participants (i.e. how many times it was ranked 1st, 2nd to 9th) in terms of risk of “not being sustained under current practices”. The lower the value, the higher level of risk. The results show that Biological Richness received the overall highest average ranking, with the three economic values of Timber Benefits (C4), Non-timber benefits (C5) and Economic Resilience (C6) tied for second. Decision Making (C7) and First Nations (C8) had the lowest average ranking.

Average Ranking
of Criteria Highest at Risk of not being Met



Interpretation – These results are generally consistent with the outcome of the Top Ranking (Biological Richness and economic values as the highest of being at risk for not being met) with Quality of Life (C9) ranked 3rd in both cases. The Average Ranking reveals, however, that there is less distinction between Quality of Life (C9) and Carbon (C3) – an interesting result as it was not ranked once as top for being at risk, and was giving a low risk rating on the 30 point allocation.

DISCUSSION

Overall Results

Overall, the results for **Average Ranking** of Importance and of Risk are the most robust of the results. The results for the Top Ranking exercise give a skewed picture of importance and do not reveal the polarized nature of importance for some of the SFM Values, while the pooling of points by a few PAG members influences the 30 Point Allocation results. While pooling of points is not unacceptable, it does represent what is considered to be a strategic move and means that the results of the exercise can vary dramatically depending on the make-up of the PAG. It does, however, indicate that certain individuals feel very strongly about specific values. As such, the Average Ranking gives a more representative picture of the overall priorities and values considered to be at risk by the PAG.

Though no **statistical analyses** were done on this data (sample size too small to pick up low levels of differences between the results), visual inspection is a valid approach to describing PAG priorities of SFM Values. Statistical analysis may be undertaken at a later date if these results do not produce any clear guidance with regard to Scenario Design. The results were not weighted according to the specific stakeholder interests/values being represented by the PAG members as the interests are not clearly defined and the numbers are too small.

Specific Outcomes

- In terms of **Prioritization**, the PAG has identified a broad range of values of being important with some level of prioritization among them. Results generally show that on average, Biological Richness (C1) was identified as the top priority among the SFM Values with Ecosystem Productivity (C2), Timber Economic Benefits (C4), Resilience (C6) and Quality of Life (C9) all receiving the same ranking of importance in 2nd place. Decision-making/Public Involvement (C7) and First Nations (C8) consistently get ranked the lowest (*but*, see discussion below).
- The results for **Values at Risk** show that Biological Richness (C1) is considered the value most at risk of not being met under current forest practices, with the three economic values (C4, C5 and C6) tied at second and Quality of Life (C9) and Carbon (C3) tied at third. Rankings revealed that both Decision-making/Public Involvement and First Nations have a low level of risk of not being met.
- **Decision Making (C7) and First Nations (C8)** consistently come out lowest in terms of priorities. There are several possible reasons for this. First, it may be that people assume that both these values will be addressed as legal requirements anyway and so they do not have to worry about giving it importance, possibly at the cost of other values. Second, it may be a case of comparing apples and oranges in these exercises. Both Criterion C7 and C8 are more process-oriented criteria than land-based resources and will differ in terms of their treatment in SFM Planning (not "modellable"). This may result in lack of clarity as to how to trade these process values off against resource values. It may also be a combination of the two reasons above. It should be stated to the PAG that both values are considered First Principles of the SFM Framework and will be addressed or included as integral to SFM Planning under the Framework.

Use of Outcomes in Scenario Design

The intent of the MCA was to establish priorities for values to be sustained in SFM scenarios in a quantified manner. The Licensee Team (LT) should discuss with the PAG how these results could assist in creating options or alternatives for Scenario Design. The individual comments submitted on each indicator can also help in this process, though they would serve as refinements of the broader types of Scenarios.

Ideally, a Technical MCA will be conducted in conjunction with the Public MCA involving a technical evaluation of impacts of alternative scenarios against C&Is based on output modelling and professional evaluation by experts. It is envisioned that the PAG and LT will review and select the top 2 or 3 Scenarios (i.e. that are most favourable) for the Technical MCA. The results of both the Public and Technical MCA will be included with the overall Scenario Analysis to be submitted to a decision maker.

Appendix VI: Scenario Forecasting Results Summary

Scenario Objective	Base Case	Max Harvest	No Harvest	Recreation	Biodiversity	SFM
	Present forecast of current management for the Vanderhoof Defined Forest Area	Investigate the impact of harvesting as much as possible in the short term to remove most pine beetle infested timber.	Investigate development of several indicators when no harvest is present, while many beetle infested stands will die and go through succession.	Investigate the impact of favoring recreation by reducing harvest in visually sensitive areas and increasing riparian reserves.	Investigate the impact of higher biodiversity objectives on indicators	Scenario that will be used for the Vanderhoof SFM plan.
Description	Current management will continue "as is" now and into the future.	Harvest all to learn about the upper boundaries for harvest flows within the district. MPB salvage will constrain these boundaries after 10 years.	No harvest, only succession through beetle killed stands.	As the Base Case but with VQO classes increased by one and riparian buffers increased to 12%.	Increased WTPs, biodiversity, model by NDU. Early, intermediate and old seral targets	Increased WTPs, late seral targets as per Draft Order Establishing Landscape Unit Biodiversity Objectives for the Prince George Timber Supply Area March 18, 2004.
Initial Harvest Level	Baseline scenario against which all the other scenarios will be compared. This scenario is intended to be representative of current management.	As high as can be maintained to remove infested and dead stands for the first 10 years.	No harvest.	5.5 million m ³ for 10 years.	5.5 million m ³ for the first 10 years, if can be maintained.	6.5 million m ³ target for the first 10 years, if can be maintained.
Difference from Base Case	5.5 million m ³ for 10 years.	Remove all seral stage, IRM and VQO constraint. Remove WTP and riparian reductions.	No harvest target.	Different VQO rules and riparian buffers.	Gross WTP reduction 15%, early seral target 33%, intermediate 33%, old 34%. By NDU. Old dead pine remains old.	Gross WTP reduction 10% (base case 8%). Late seral targets by NDU, not LU and BEC variant. Old dead pine remains old.
THLB	781,462 ha	864,008	0	748,019 ha	712,292	777,729 ha

Appendix VII: Criteria, Indicators, Measures and Targets Development Chart

VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
ECOLOGICAL	1-1 Ecologically distinct habitat types are represented in an unmanaged state in the DFA to sustain lesser known species and ecological function.	1-1.1 The percent area of distinct habitat types in DFA.	See Table 7 in SFMP text	See Table 7 in SFMP text
1. Biological richness and its associated values are sustained within the DFA.	1-2 The amount, distribution, and diversity of terrestrial and aquatic habitat types elements and structure important to sustain biological richness are sustained.	1-2.1 Number of snags and / or live trees per hectare over a prescribed area. (1,5)	Average of ≥ 8 snags and/or live trees/ha after harvesting. Average of ≥ 4 snags and/or live trees/ha at free growing age.	-2 snag/live trees/ ha. -1 snag/live trees/ ha.
		1-2.2 Average amount of Coarse Woody Debris per hectare on prescribed areas. (1,5)	Annually ≥ 4 logs/ha after harvesting. Annually	0 logs
		1-2.3 The percent conformance with riparian reserve zone strategy/standards.	100% Annually	-5%
		1-2.4 The proportion of shrub habitat (%) by NDU.	5.7% See Table 8 in SFMP text	-0.5% See Table 8 in SFMP text
		1-2.5 The proportion of deciduous species (%) by NDU.	4.9% of the landbase See Table 9 in SFMP text	-0.5% See Table 9 in SFMP text
		1-2.6 The minimum proportion of late seral forest (%) by NDU.	See Table 10 in SFMP text	See Table 10 in SFMP text
		1-2.7 The percent area by patch size class by NDU.	See Table 11 in SFMP text	See Table 11 in SFMP text
		1-2.8 The plant diversity index for site association groups above the baseline targets on the THLB.	See Table 12 in SFMP text	See Table 12 in SFMP text
		1-2.9 The average stand level percent retention for all harvested blocks by NDU.	See Table 13 in SFMP text	See Table 13 in SFMP text
		1-2.10 Develop "Management Strategies" for riparian sensitive species (Beaver) to achieve early seral deciduous conditions.	December 31, 2005	+3 months

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VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
		1-2.11 Stream crossings density by watershed.	≤ 0.266 the average number of stream crossing /km of road by watershed. Annually	+10%
		1-2.12 Percentage of stream crossings planned and installed to design / standard.	100% Annually	-10%
		1-2.13 Percentage of stream crossing inspections and resulting mitigation measures completed according to schedule.	100% Annually	-10%
		1-2.14 The percentage of area within the THLB in permanent access. (1,2)	Area in permanent access < 4.2%. Annually	+1%
		1-2.15 The percent conformance with the Access Management Plan. (1,5,9)	100% Annually	-10%
		1-2.16 Effectiveness Monitoring Plans are developed and implemented for selected access management areas to continuously improve access points. (1,5,9)	September 1, 2005	+ 3 months
	1-3 Productive populations of selected species are well distributed throughout the range of their habitat.	1-3.1 Effectiveness Monitoring Plans (Wildlife) are developed and implemented for selected indicator species to test management targets developed for indicators 1 and 2.	December 31, 2006	+3 months
		1-3.2 Develop "Management Strategies" for all Species at Risk.	December 31, 2006	+3 months
		1-3.3 Percentage of the Species at Risk "Management Strategies" being implemented as scheduled.	100%	-5%
	1-4 Water resources are sustained by maintaining quality and quantity	1-4.1 The percent conformance with riparian reserve zone strategy/standards.	Annually starting in 2007 100% Annually	-5%
		1-4.2 Stream crossings density by watershed.	≤ 0.266 the average number of stream crossing /km of road by watershed. Annually	+10%
		1-4.3 Percentage of stream crossings planned and installed to design / standard.	100% Annually	-10%

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VALUE & CRITERION		INDICATOR	MEASURE	TARGET	VARIANCE
			1-4.4 Percentage of stream crossing inspections and resulting mitigation measures completed according to schedule.	100% Annually	-10%
			1-4.5 The percentage of area within the THLB in permanent access. (1,2)	Area in permanent access < 4.2%. Annually	+1%
		1-5 Genetic diversity of plant species within the Defined Forest Area (DFA) is sustained.	1-5.1 The percentage of seed for coniferous species collected and seedlings planted in accordance with the Forest and Range Practices Act.	100%	-5%
			1-5.2 The plant diversity index for site association groups above the baseline targets on the THLB.	See Table 12 in SFMP text	See Table 12 in SFMP text
			1-5.3 The percent area of distinct habitat types in DFA.	See Table 7 in SFMP text	See Table 7 in SFMP text
ECOLOGICAL		2-1 Soil productivity within the Timber Harvesting Land Base is sustained.	2-1.1 Site Index for managed stands within the THLB at the subzone level is sustained.	See Table 19 in SFMP text	See Table 19 in SFMP text
2. The productive capability of forest ecosystems within the Timber Harvesting Land Base is sustained.			2-1.2 Number of hectares of landslides resulting from forestry practices.	Landslide area < 20 cumulative ha. Annually across the DFA	+ 2ha
			2-1.3 Percentage of blocks meeting soil conservation targets after harvesting and silviculture activities.	100% Annually	-5%
		2-2 Amount of productive forest land and road in the Timber Harvesting Landbase.	2-2.1 The percentage of productive forest area (hectares) in the THLB.	100% Annually	-5%
			2-2.2 The percentage of area within the THLB in permanent access. (1,2)	Area in permanent access ≤ 4.2%. Annually	+1%

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VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
	2-3 Post harvest regeneration on the Defined Forest Area is sustained.	2-3.1 Percent of harvested blocks meeting the regeneration delay date. (2,4)	100% Annually	-5%
		2-3.2 Percent of harvested blocks meeting the free growing assessment date. (2,4)	100% Annually	-5%
	2-4 Active research plots are not disturbed by forest operations.	2-4.1 The percentage of active research plots protected from harvesting and silviculture activities.	100% Annually	-10%
ECOLOGICAL	3. Forest ecosystem contributions to global ecological cycles are sustained within the DFA.	3-1 Ecological cycles: The total forest area and area of water bodies are sustained within the DFA.	0%	+/-2%
		3-1.1 The percent area change of total forested land.	Measured at each Timber Supply Analysis period.	
		3-1.2 The percent area change of water bodies.	0% Measured at each Timber Supply Analysis period.	+/-2%
	3-2 Carbon: Total forest ecosystem biomass and carbon pools are sustained in the DFA.	3-2.1 Carbon Monitoring Plan is developed and implemented for forest ecosystem biomass and carbon pools.	June 30, 2006	+3 months
		3-2.2 The percentage of blocks where a portion of the residual wood is utilized or left on block to contribute to other values.	≥5%	-5%
ECONOMIC	4. The flow of economic benefits from forests through the forest industry is sustained.	4-1 Timber harvesting continues to contribute to economic well-being.	5,500,000 m3/year Until 2009	+/- 1,000,000m3/year
		4-1.2 Total Projected Timber Supply (m3/year).	2,570,000 m3/year	+/- 257,000 m3/year

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VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
		4-1.3 The Percent of harvested blocks meeting the regeneration delay date. (2,4)	100% Annually	-5%
		4-1.4 The Percent of harvested blocks meeting the free growing assessment date. (2,4)	100% Annually	-5%
	4-2 The Public continues to receive a portion of the benefits.	4-2.1 The percent of money spent on forest operations and management on the DFA provided from the northern central interior suppliers (Stumpage not included).	>80% Annually	-5%
		4-2.2 The percent of stumpage paid annually on time.	100% Annually	0%
		4-2.3 The percent of Municipal and other taxes paid annually on time.	100% annually	0%
		4-2.4 The number of Kilometers of forest road maintained annually for public use. (4,9)	≥ 300km Annually TBD	-30km
		4-2.5 Annually, the number of support opportunities provided in the DFA. (4,6,9)	≥ 100 Annually	-10
	4-3 Opportunities to share a portion of the benefits continue to exist for Aboriginals.	4-3.1 Annually the number of business relationships and opportunities made available and taken up.	≥ 12 Annually Types will be broad categories	-2
	4-4 A competitive, diversified forestry sector exists.	4-4.1 Total volume of timber harvested in the DFA (m3/yr) (Actual)	5,500,000 m3/year Until 2009	+/- 1,000,000m3/year
		4-4.2 Total Projected Timber Supply (m3/yr).	2,570,000 m3/year	+/- 257,000 m3/Year
	4-5 Levels of forest damaging events or agents are managed such that their economic impact is minimized.	4-5.1 The percent of operating area managed under a Fire Preparedness Plan. (4,9)	100% Annually	-5%
		4-5.2 The number of hectares of accidental forest industry operational related fires.	<100ha Annually	+10 ha
		4-5.3 Develop "Management Strategies" for damaging agents.	December 31, 2005	+3 months

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VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
		4-5.4 The percent of Management strategies in place and implemented to reduce the impact of damaging events or agents (ie: the annual harvest targeted towards beetles).	100%	0%
Economic	5-1 The amount and quality of marketed non-timber forest resources does not decline over time.	5-1.1 Average amount of Coarse Woody Debris per hectare on prescribed areas. (1,5)	Annually starting 2006 Average of ≥ 4 logs/ha. Annually after harvest.	0 logs
		5-1.2 Number of snags and or live trees per hectare over a prescribed area. (1,5)	Average of ≥ 8 snags and/or live trees/ha after harvesting. Average of ≥ 4 snags and/or live trees/ha at free growing age. Annually	-2 snags and/or live trees. -1 snag and/or live tree.
		5-1.3 The percent conformance with the Access Management Plan. (1,5,9)	100% Annually	-10%
		5-1.4 Effectiveness Monitoring Plans are developed and implemented for selected access management areas to continuously improve access points. (1,5,9)	September 1, 2005	+ 3 months
		5-1.5 The percent of Site Plans conserving unique or significant identified cultural features. (5,9)	100% Annually	0%
		5-1.6 The percent of forest management operations consistent with the conservation of unique or significant identified cultural features. (5,9)	100% Annually	-5%
		5-1.7 The percent of Site Plans conserving range resources for those areas that have identified range resources.	100% Annually	0%
		5-1.8 The percent of forest management operations consistent with the conservation of range resources identified in the Site Plan.	100% Annually	-5%

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VSMFP VERSION 1.0 - JULY 29, 2005

VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
		5-1.9 The percent of Site Plans conserving riparian values for those areas that have identified riparian values	100% Annually	0%
		5-1.10 The percent of forest management operations consistent with the conservation of riparian values identified in the Site Plan.	100% Annually	-5%
		5-1.11 The percent of Site Plans within a Scenic Area that meet Visual Quality Objectives. (5.9)	100% Annually	0%
		5-1.12 The percent of forest management operations consistent with the conservation of Visual Quality Objectives in the Site Plan. (5.9)	100% Annually	-5%
Economic	6-1 Employment and income sources and their contribution to the local economy continue to be diversified.	6-1.1 The percent of businesses within the DFA given an opportunity to quote on forest management tendered contracts.	100% Annually	-5%
		6-1.2 The number of opportunities given to businesses within the DFA to provide non-tendered services to forest management activities.	Number of opportunities $\geq$ 40 Annually (to baseline)	-4
		6-1.3 Annually the number of business relationships and opportunities made available and taken up.	Number of opportunities $\geq$ 100 Annually Add broad types in a table	-10
		6-1.4 The number of research and development projects and or partnerships completed within the DFA.	Number of partnerships $\geq$ 3 Annually	-1
		6-1.5 Annually, the number of support opportunities provided in the DFA. (4.6,9)	Number of opportunities $\geq$ 100 Annually Specifics identified in table	-10

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VSFMP VERSION 1.0 - JULY 29, 2005

VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
		6-1.6 The percentage of direct employment and number of person years derived from the forest industry in comparison to other sectors within the DFA.	To be determined by December 2005.	To be determined by December 2005.
		6-1.7 The number of different forest products produced within the DFA. (6.9)	Number of products ≥ 9 Annually	-2
SOCIAL 7. Decisions guiding forest management on the DFA are informed and respond to a wide range of social and cultural values.	7-1 Forest management planning adequately reflects the interest and issues raised by the public in the DFA through an effective public participation process.	7-1.1 Number of Public Advisory Group meetings per year.	Number of meetings ≥ 2 Annually	-1
		7-1.2 Measure the level of satisfaction of the PAG members with the process annually.	Satisfaction index ≥ 4 Annually	-0.5
		7-1.3 Maintain and review annually the SFM plan PAG TOR, to ensure a credible and transparent process.	100% Annually	0%
		7-1.4 The percent of timely responses to written and documented concerns categorized by value.	100% Annually	-10%
		7-1.5 Through an ongoing survey (at least annually), measure the level of residents and stakeholders and Aboriginal satisfaction to forest management (process and outcomes). (7.8)	Satisfaction index ≥ 4 Annually	-0.5
		7-1.6 The number and variety of effective opportunities given to the residents and stakeholders to express forestry related concerns and be proactively involved in planning processes (i.e.: FSP, harvest & road schedule). Summarized annually.	≥ 24 Annually table to show variety of opportunities	-4

Date: June 8, 2005

V/SFMP VERSION 1.0 - JULY 29, 2005

VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
	7-2 The collective understanding of Sustainable Forest Management by the forest industry and the public is increased.	7-2.1 The number of times the SFM plan and associated annual reports will be communicated to the public for review and comment annually.	Number of times ≥ 1 Annually	0
		7-2.2 The number of opportunities provided for SFM extension activities annually.	Number of opportunities ≥ 4 Annually Specifics will be included in a table format	-1
		7-2.3 Increase the level of understanding of SFM annually.	Understanding index ≥ 4 Annually	-0.5
SOCIAL 8. Forest management sustains or enhances cultural, health and capacity benefits that Aboriginal people derive from forest resources.	8-1 Forest management recognizes and respects Aboriginal and treaty rights.	8-1.1 The number of opportunities provided to Aboriginal people to be involved in planning processes.	Number of opportunities ≥ 12 Annually Specifics will be included in a table format	-2
		8-1.2 The SFMP PAG Terms of Reference will be reviewed annually to recognize that aboriginal participation in the public process will not prejudice Aboriginal and treaty rights.	100% Annually	0%
		8-1.3 Through an ongoing survey (at least annually), measure the level of residents and stakeholders and Aboriginal satisfaction to forest management (process and outcomes). (7,8)	Satisfaction index ≥ 4 Annually	-0.5
		8-1.4 Annually, through a survey, measure the level of Aboriginal satisfaction related to forest management.	Satisfaction index ≥ 4 Annually	-0.5
		8-1.5 The percentage of management plans approved in the DFA by the Designated Decision-Maker.	100% Annually	0%

Date: June 8, 2005

VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
	8-2 Maintain Aboriginal access to forest resources and socio-economic benefits.	8-2.1 The number of socio-economic opportunities made available annually.	Number of opportunities ≥ 10 Annually Specifics will be included in a table format	-2
	8-3 The opportunity by Aboriginal communities to participate in Sustainable Forest Management.	8-3.1 The number of opportunities available for Aboriginals to be involved in planning processes. 8-3.2 The number of Aboriginal forest based traditional use studies (TUS) or knowledge information used in the planning processes.	Number of opportunities ≥ 12 Annually Add in a table traditional use studies ≥ 1 Annually	-2 0
SOCIAL 9. Forest management sustains ongoing opportunities for a range of quality of life benefits.	9-1 Maintain opportunities for outdoor recreation activities	9-1.1 The number of hectares and percent of the DFA that has planned access (restrictions + non-restrictions) in place by access management area to provide a diversity of recreation opportunities.	295,131 ha and 35.3 % Annually	0 ha and 0%
		9-1.2 Effectiveness Monitoring Plans are developed and implemented for selected access management areas to continuously improve access points. (1,5,9)	September 1, 2005	+3 months
		9-1.3 The percent conformance with the Access Management Plan. (1,5,9)	100% Annually	-10%
		9-1.4 The number of Kilometers of forest road maintained annually for public use. (4,9)	≥ 300 km Annually TBD	-10%
	9-2 Maintain the Visual Quality of the managed landscape	9-2.1 The percent of Site Plans within a Scenic Area that meet Visual Quality Objectives. (5,9)	100% Annually	0%

Date: June 8, 2005

VSFMP VERSION 1.0 - JULY 29, 2005

VALUE & CRITERION	INDICATOR	MEASURE	TARGET	VARIANCE
		9-2.2 The percent of forest management operations consistent with the conservation of Visual Quality Objectives in the Site Plan. (5,9)	100% Annually	-5%
	9-3 Forest management conserves the unique or significant cultural features within the DFA.	9-3.1 The percent of Site Plans conserving unique or significant, identified cultural features. (5,9)	100% Annually	0%
		9-3.2 The percent of forest management operations consistent with the conservation of unique or significant, identified cultural features. (5,9)	100% Annually	-5%
	9-4 Maintain worker and public safety within the DFA	9-4.1 The number of company related forestry management operation accidents each year. (LTA)	0 Annually TBD	+ 2
		9-4.2 The percent of road inspections meeting defined safety standards.	100% Annually	-2%
		9-4.3 The percent of operating area managed under a Fire Preparedness Plan. (4,9)	100% Annually	-5%
		9-4.4 The percent of prescribed burns that follow the smoke management guidelines.	100% Annually	-10%
	9-5 Maintain support for local organizations within the DFA.	9-5.1 Annually, the number of support opportunities provided in the DFA. (4,6,9)	Number of opportunities ≥ 100 Annually	-10
		9-5.2 The number of different forest products produced within the DFA. (6,9)	Number of products ≥ 9 Annually	-2

Date: June 8, 2005

VSFMP VERSION 1.0 - JULY 29, 2005

Appendix VIII: Biological Richness – Further References and Guidance to Scientific Research

Biological Richness – Guidance to Scientific Research

Arcese, P and A.R.E. Sinclair. 1997. The role of protected areas as ecological baselines. *Journal of Wildlife Management* 61:587-602.

Bunnell, F.L. 1998. Setting goals for biodiversity in managed forests. Pp. 117-153 in F.L. Bunnell and J.F. Johnson (eds). *Policy and practices for biodiversity in managed forests: The living dance*. UBC Press, Vancouver, B.C.

Bunnell, F.L. 2002. Establishing objectives and evaluating success. Chapter 2 in *Sustaining biological diversity on TFL-48*. Review draft prepared for Canfor TFL-48. Chetwynd, B.C. 19pp.

Bunnell F.L., B.G. Dunsworth, D.J. Huggard, and L.L. Kremsater. 2003. *Learning to sustain biological diversity on Weyerhaeuser's coastal tenure*. The Forest Project, Weyerhaeuser, Nanaimo, BC.

Forest Ecosystem Solutions. 2004a. *Ecosystem representation in the Vanderhoof Forest District*. A report prepared for Canadian Forest Products and Slocan - Plateau Division. 47p.

Forest Ecosystem Solutions. 2004b. *SFM indicator mapping for the Vanderhoof Forest District*. A report prepared for Canadian Forest Products Ltd - Plateau Division. 55p.

Lindenmayer D.B. and J.F. Franklin. 2002. *Conserving forest biodiversity: A comprehensive multi-scaled approach*. Island Press, Washington, DC. 351 p.

Margules, C.R. and R.L. Pressey. 2000. Systematic conservation planning. *Nature* 405: 243 – 253.

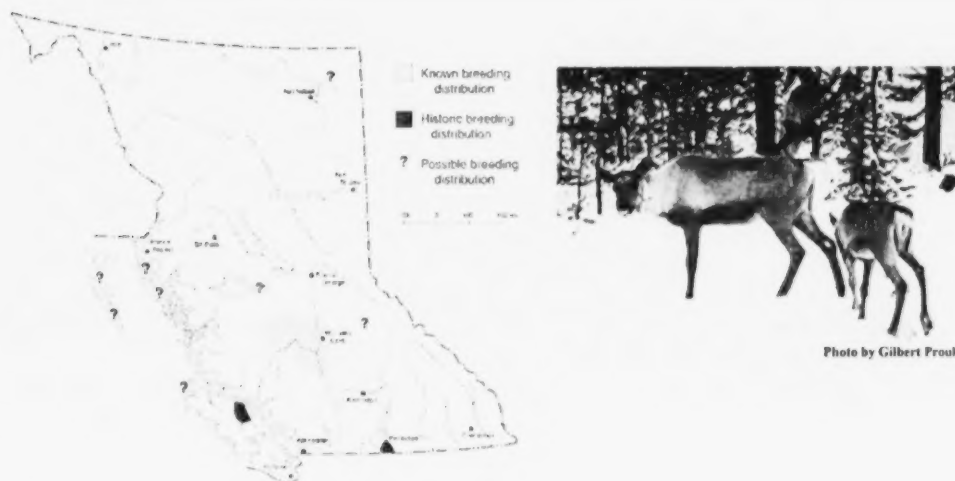
Wells, R. W., Isabelle, I., Mandy, M. and Haag, D. 2003. *Local Level Indicators for Biodiversity: A preliminary evaluation of the Prince George TSA (McGregor Model Forest)*.

Appendix IX: SFM Implementation Roles and Responsibilities Matrix

INTERNAL DOCUMENT

**Appendix X: Overview of each Species at Risk in the Vanderhoof Defined Forest
Area**

Northern Mountain Caribou (*Rangifer tarandus* pop. 15)



Distribution – The primary range of the northern mountain caribou in the Vanderhoof DFA is in the southwestern portion of the Vanderhoof Forest District, east of Tweedsmuir Provincial Park. These caribou are known as the Tweedsmuir-Entiako herd and they use range extending from Eutsuk Lake in the west to the Fawnie Mountains in the east. Ootsa Lake binds northern extents of the range and Qualcho Lake roughly binds the southern extent (Cichowski 1993 in Yaremko and Sulyma 2004).

Habitat – The following biogeoclimatic subzones are encountered throughout the areas identified for caribou habitat within the DFA:

- Sub-boreal pine spruce, moist cold subzone (SBPS mc)
- Sub-boreal spruce, Babine moist cold and Kluskus moist cold subzones (SBS mc2 and SBS mc3)
- Engelmann spruce-subalpine fir, Nechako moist very cold subzone (ESSF mv1)

Northern Mountain caribou are most concentrated in the uppermost portion of the Engelmann Spruce-Subalpine Fir (ESSF) biogeoclimatic zone, at roughly 1700 to 2100 m. However, lower elevations may be used in early winter and spring (Kinley 2001). The Interior Wetbelt is composed of the wet and very wet subzones of the ESSF zone, wet and very wet subzones of the Interior Cedar-Hemlock (ICH) zone, and very wet sub-zones of the Sub-Boreal (SBS) zone (Stevenson et al. 2001).

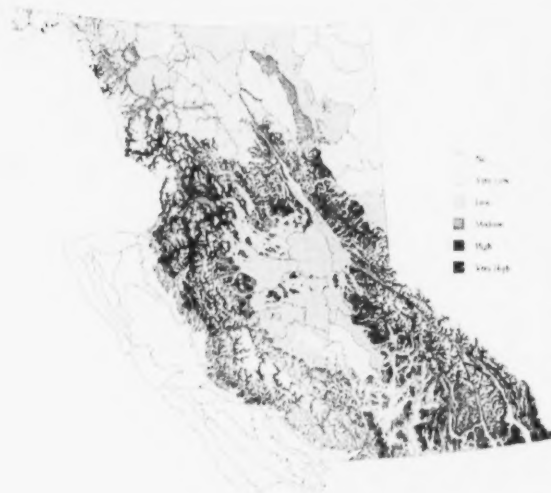
Armleder and Stevenson (1994) have summarized the characteristics of habitat utilization by mountain caribou. This ungulate occurs at low densities and ranges in different areas depending on the season. Throughout the winter, caribou use old forests and avoid immature stands (Simpson et al. 1985, Seip 1992). In early winter, as snow is accumulating to depths of three meters or more in the upper ESSF, caribou use the lower parts of the ESSF SBS or SBPS zones, or areas where snow is not as deep. Most stands used by caribou in early winter are

commercially valuable. Shrubs supplement winter lichen forage until snow burial makes them unavailable. As snow densities increase to levels that will support caribou, the animals move up in elevation and feed almost exclusively on arboreal lichens for the rest of the winter. In the late winter there is less conflict with forest management since most stands used by caribou at that time of year are non-merchantable.

Current status of management – The Vanderhoof LRMP and the draft Northern Caribou Ungulate Winter Range in the Vanderhoof Forest District both identify caribou as an important species of concern. Of primary management concern in the Vanderhoof DFA is the Tweedsmuir-Entiako Northern Caribou Herd. Currently, the LRMP has identified the Entiako RMZ, which now is encompassed by the Entiako Protected Area, and the Laidman Lake RMZ. Both of the LRMP areas are important caribou habitat areas. More recently, the draft caribou ungulate winter range is proposed to derive 8 ungulate winter ranges for the Tweedsmuir-Entiako herd, including four high elevation winter range areas and four low elevation winter range areas.

Current Forest Development Plans observe the Entiako Protected Area and future Forest Stewardship Plans will incorporate the new ungulate winter range areas identified by the draft northern caribou strategy.

Grizzly Bear (*Ursus arctos horribilis*)



Distribution – The grizzly bear is found in the DFA at various density levels ranging from low (e.g., near human settlements) to high (e.g., mountainous areas) (Government of BC 1997a).

Habitat – High diversity of habitat is necessary to enable grizzly bears to cope with climatic stresses, human impacts, and the seasonal and annual changes that occur in food abundance and availability (Jonkel 1987). Appropriate habitat for grizzly bears must include local seasonal abundance of foods within a diverse habitat mosaic. Appropriate habitats can be categorized as including early seral to climax vegetation, wet to dry habitat types, and altitudinal vegetation belts from river bottom to alpine (Banci 1991).

Wet areas such as stream and river bottoms, seep areas, and lakeshores provide the bulk of the food for bears in some regions, because plant productivity in such areas is high and the vegetation is succulent or high in protein (Mace and Jonkel 1979, Lee and Jonkel 1981).

River floodplains, benches and avalanche chutes also produce abundant bear food and are especially important during spring as they are the first habitats where the snow melts and vegetation grows (Banci 1991). Within the Vanderhoof DFA, grizzly bear food habits vary with landscapes. For example, there is a marked difference in the food habits of mountain (alpine habitats with little logging activities) and plateau (lower elevation with extensive logging activities) bears. While both populations graze in the spring, mountain bears prefer digging for roots while plateau bears feed on berries. Plateau bears also have a greater proportion of moose in their diet (Ciarniello and Paczkowski 2001).

Grizzly bear habitat must also contain adequate cover for travel, during feeding, and for escape (Zager and Jonkel 1983). One specific habitat type in terms of vegetation or forest structure has not been identified as being important for grizzly bears. However, old-growth forest may provide thermal protection, security, and denning sites to bears (Jonkel 1987, Banci 1991).

Openings created by fires and in some areas by logging are important feeding areas for some grizzly bears (Banci 1991). Travel corridors are also important units of grizzly bear habitat where food, water or denning habitats are widely dispersed (Jonkel 1987, Banci 1991). While grizzly bears may den in caves or under large stumps (Ciarniello and Paczkowski 2001), they often dig their own hibernation dens and do not commonly use natural shelters (Craighead and Craighead 1972).

Current status of management – Currently, site specific management strategies for grizzly bear do not exist. However, the LRMP identifies grizzly bear as an objective and contains general strategies which include:

- Endorsement for identification and mapping of high suitability and capability grizzly habitat.
- In high value grizzly habitat areas, endorsement for deactivating non-essential secondary roads and minimizing the amount and duration of new road access, particularly near critical habitat such as riparian areas, seeps or springs, high elevation burns and subalpine forest.
- Endorsement for managing for a mosaic of habitat types and characteristics (vegetation types, age class and spatial distribution) in accordance with the natural disturbance type.

To date, critical grizzly bear habitat has not been identified. However, Forest Development Plans contain general measures to manage and conserve grizzly habitat, where applicable. The measures include:

- Managing with landscape level biodiversity principles including maintaining a mosaic of age classes and patch sizes.
- Monitoring the amount of interior forest habitat within landscapes.
- Providing for connectivity corridors that link a variety of habitat and landscape types.
- Implementation of general stand level diversity measures such as riparian management practices and wildlife tree patches.
- Addressing access management issues in consultation with Government Agencies.

A local Licensee (Canfor) funded the production of an evaluation of grizzly bear habitat in the Finger and Tatuk Lakes region of the Vanderhoof DFA (Paczkowski 2002). This evaluation

has provided historical and ecological information regarding grizzly bears. Grizzly bear was assessed using remote sensing, ground surveys, aerial surveys, and habitat plots. This study will potentially be used to help with the overall management of grizzly bears within the DFA.

Fisher (*Martes pennanti*)



Distribution – Fisher is found throughout the DFA.

Habitat – The fisher has been reported to inhabit landscapes dominated by mature coniferous and mixed coniferous-deciduous forests (Coulter 1966, Kelly 1977, Powell 1977). In the western provinces/states and in the Rocky Mountains, fishers appear to prefer late-successional coniferous forests and riparian habitats, particularly at elevations of <1000 m (Raphael 1984, 1988, Rosenberg and Raphael 1986, Jones and Garton 1994). However, they are known to use mid-successional forests (Proulx and Banci 2003). Fisher movements may be restricted by snow accumulations (Raine 1983, Krohn et al. 1997). Natal dens (where parturition occurs) and maternal dens (other dens where kits are raised) are mostly located high in cavities in living and dead trees with dbh values ranging from 38 to 127 cm, but preferably ≥ 50 cm (Leonard 1980, Arthur 1987, Jones 1991). Powell (1994) reported mean home ranges of 15 and 38 km² for females and males, respectively. In central British Columbia, Weir et al. (2002a) estimated that annual home ranges of female and male fishers were 35 and 137 km², respectively.

Current status of management – Fisher home ranges are large, and there are no specific management strategies in place. However, knowledge exists that the fisher avoids large unforested areas, but takes advantage of landscapes where early-seral stages are interspersed with mid and late-seral stages (Proulx and Banci 2003, Proulx and Kariz 2001). Although there is no direct management strategy for the fisher in place, the following management strategies are currently being applied to provide benefits for fisher:

- Landscapes are managed to provide for a mosaic of young and mature forests interspersed with early-seral stages originated from fire, blowdowns, or clearcuts;

- Interior forest habitats are being maintained that generally consist of coniferous or mixed stands with > 30% canopy closure and > 20 m²/ha basal area in mature trees are implemented within FDPs.
- Forest remnants are maintained within clearcut areas (wildlife tree patches and riparian reserves)

Wolverine (*Gulo gulo*)



Distribution – Wolverine inhabits various areas of the DFA.

Habitat – Broadly, wolverines are restricted to boreal forests, tundra, and western mountains (Banci 1994). The ESSF and alpine biogeoclimatic zones are most important for this species. Wolverines use a variety of broad ecosystem units. The following habitats are most important: alpine ecosystems, avalanche tracks, black cottonwood riparian with or without hybrid white spruce, Engelmann spruce riparian, interior western hemlock-Douglas fir and/or white spruce, white spruce-balsam poplar riparian, and western red cedar-black cottonwood riparian (Weir 2002b).

At the landscape level, their habitat is best defined in terms of adequate year-round food supplies in large, sparsely inhabited wilderness areas, rather than in terms of particular types of topography or plant associations (Kelsall 1981). While the characteristics of wolverine habitats vary greatly (Banci 1994), young and mature coniferous stands with a dense canopy closure ($\geq 45\%$) have been reported as favorable to wolverine (Hornocker and Hash 1981, Proulx and Cole 1996). However, in the summer, wolverines may use subalpine and alpine plant associations at high elevations in order to avoid warm temperatures (Hornocker and Hash 1981).

Atypical or low quality habitats may be important to wolverines if they connect otherwise isolated populations and allow for genetic exchange or colonization. Maternal dens may be found in live coniferous trees, hollow logs, tree cavities, brush piles, rock piles, dens of other animals,

and under fallen logs (Proulx 2000). In the Omineca Region, Lofroth (2001) reported that at least 50% of the locations of radio-tracked wolverines were in late-successional stands; females tended to use both early-successional (at high elevations) and late-successional stands, and males used mostly late-successional stands. Dens consist mostly of masses of fallen trees (windfall, avalanches, etc.) or rocky colluvium at high elevations (ESSF/ESSFp ecotone). Home ranges are very large (1366 km² for males and 405 km² for females in the Omineca Region – Lofroth 2001). In the Omineca Region, moose are consumed throughout the year by all age and sex classes (Lofroth 2001). During the harsh winter environmental conditions, wolverines rely heavily on caribou, avalanche-killed ungulates, and carrion resulting from wolf predation.

Current status of management – Wolverines have very large home ranges (most British Columbia parks are not large enough to encompass the home range of a wolverine), and habitat management must be conducted at landscape level. Weir (2002b) recommends the following:

- Maintain large refugia;
- Allow wolverines to avoid operational areas;
- Minimize road access (because wolverines have low resiliency to population reduction).

Currently, there are no management strategies in place for the wolverine. However, knowing that wolverines in the Omineca Region are dependent upon caribou and other ungulates, they will benefit from habitat management guidelines developed for caribou. Medium and high suitability caribou habitats are largely protected from forest harvest and have minimum road access. At low elevations where timber harvesting is more extensive and creates extensive moose (an important food item) habitat, mosaics of late-seral stages interspersed with young successional stands are adequate for wolverine and other species at risk, e.g., fisher and grizzly bear.

Beaverpond Baskettail (*Epitheca canis*)

No distribution map is available.

Distribution – Throughout the Vanderhoof DFA.

Habitat – Require open, shallow, still water for reproduction.

Current status of management – Currently, there are no specific management strategies in place for the Beaverpond baskettail in the DFA. However, riparian management practices are being applied to all forest operations adjacent to wetlands and other water bodies.



Short-eared Owl (*Asio flammeus*)

No distribution map is available.

Distribution – The short-eared owl is a rare resident of the Vanderhoof area (Campbell et al. 1990). Distribution unknown.

Habitat – The short-eared owl prefers to breed in relatively open country such as grassland, grassy or bushy meadows, marshland, sloughs, beaches, sedge fields, and previously forested areas that have been cleared (Voous 1988, Campbell et al. 1990, Semenchuk 1992).



Current status of management – Currently, there are no specific management strategies in place for the short-eared owl.

American Bittern (*Botaurus lentiginosus*)

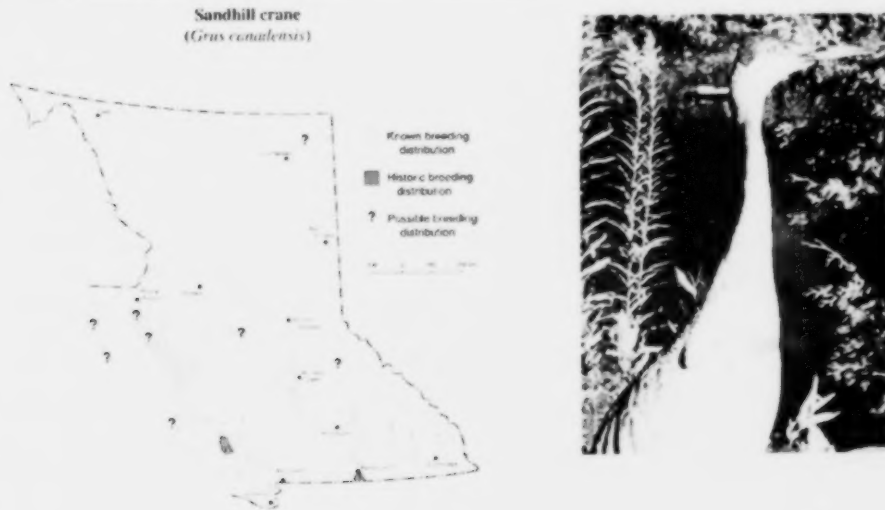


Distribution – The American bittern breeds from the U.S. border northward through the central valleys and plateaus to Bear Lake, 80 km north of Prince George (Campbell et al. 1990, Government of BC 1997a).

Habitat – The American bittern is a secretive bird inhabiting lush, emergent vegetation along the borders of lakes, marshes and rivers. Nests are well concealed and built over water up to 30 cm deep (Campbell et al. 1990). Extensive stands of emergent vegetation and stable waters are important for successful breeding (Government of BC 1997a). The American bittern inhabits wetlands of all sizes, but tends to be more abundant on larger wetlands.

Current status of management – Currently, there are no specific management strategies in place for the American bittern. However, riparian management practices are being applied to all forest operations adjacent to wetlands and other water bodies.

Sandhill Crane (*Grus canadensis*)



Distribution – The sandhill crane is known to have breeding areas on the east side of the Vanderhoof Forest District (Government of BC 1997a). It is also a migrant in the Vanderhoof area (Campbell et al. 1990).

Habitat – The sandhill crane requires shallow freshwater wetlands with emergent vegetation (sedge, cattails, bulrush, hardhack, willows, Labrador tea) for nesting and brood rearing. Nesting wetlands are usually secluded, free from disturbance and surrounded by forest (Government of BC 1997a). The characteristics of non-breeding habitat include an unobstructed view of surrounding areas and isolation from disturbance (Lovvorn and Kirkpatrick 1981). Its roosting and feeding habitats include shallow wetlands such as margins of lakes, marshes, swamps, bogs, ponds, meadows as well as flooded meadows, grasslands and agricultural fields (Campbell et al. 1990).

Current status of management – Currently, there are no specific management strategies in place. However, riparian management strategies are in place and apply to all operations adjacent to wetlands and other water bodies. Although local sightings have been reported, inventory information on local habitat areas is not well documented.

American White Pelican (*Pelecanus erythrorhynchos*)



Distribution – Prince George and Vanderhoof Districts.

Habitat – Pelicans nest at only one location in British Columbia – Stum Lake, 70 km Northwest of Williams Lake. Birds from the Stum Lake colony forage in lakes, rivers, and streams over a broad area of the Fraser Plateau, approximately 30000 km². A substantial population of pelicans, of unknown breeding status, forage at Nulki and Tachik lakes, 15 km southwest of Vanderhoof.

Current status of management – Currently, there are no specific management strategies in place for the pelican in the management area. However, riparian management practices are being applied to all forest operations adjacent to wetlands and other water bodies.

White Sturgeon (*Acipenser transmontanus*) Nechako River Population

No distribution map is available.

Distribution – The Nechako River and its tributaries, including the Stuart River Watershed.



Habitat – Freshwater fish species that spends its lifespan in the Nechako River or its tributaries. According to a study completed by BC Environment and BC Fisheries, at least five distinct populations of white sturgeon exist in the Fraser and Nechako River systems. Genetic analyses indicate that Nechako sturgeon are distinct from other Fraser populations, and that they do not migrate to the Fraser River but do move freely between the Nechako and Stuart Rivers.

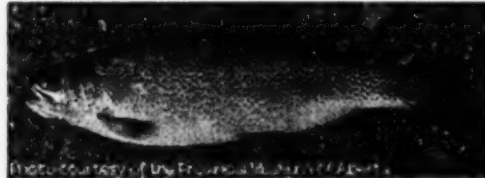
Current status of management – Currently the Nechako River sturgeon have been classified as “critically imperiled” by the BC Conservation Data Center. This population is at risk of becoming extinct and the province has initiated a process to develop a Recovery Plan. One of the

key roles for the Nechako white sturgeon recovery planning process will be to review possible causes for sturgeon decline and to determine what options are available to remedy the situation.

Cutthroat Trout *clarki* subspecies (*Oncorhynchus clarki clarki*)

No distribution map is available.

Distribution – Found from southern Alaska to the Eel River in California. Usually do not extend very far inland and in BC, are not usually found past the Skeena River headwaters.
(Information from BC Fish Facts)



Habitat – Prefers relatively small streams, with gravel bottoms and gentle gradients. Spawning adults migrate from the ocean into streams to spawn. Young fish usually stay in streams for a year or two before entering the ocean, but some populations never go to salt water at all. In rare cases, some individuals of ocean-going populations, may remain in fresh water for as long as eight years

Current status of management – Currently, there are no specific management strategies in place for the Cutthroat Trout in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.

Bull Trout (*Salvelinus confluentus*)



Distribution – Bull trout likely occur in all mainland ecozones except those in the Kettle, Okanagan and Lewes river drainages. It may be absent from the Alsek river system on the north coast. It does not occur on Vancouver Island, the Queen Charlotte Islands or most coastal mainland ecozones.

(Information from: http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/other/species/species-01.htm#P65_4045).

Habitat – Bull trout are extremely sensitive to habitat degradation and are considered an indicator species of ecosystem health. They appear to have a narrower range of habitat

preferences than other salmonids and require clean, well-oxygenated water within a narrow range of cold temperature conditions. They may be found in high gradient areas (up to 30%) where other game fish would not be expected to occur. They are uncommon where temperatures exceed 15°C. When temperatures increase, the risk of invasion by other species that may displace bull trout increases.

The distribution and abundance of bull trout is strongly influenced by channel and hydrologic stability, substrate composition, cover, temperature and the maintenance of migration corridors. Woody debris and channel complexity may also be important. Bull trout require large, deep pools for over wintering. Increased sedimentation may lead to reduced pool depths and pool frequency, as well as reductions in interstitial spaces and channel braiding. Increased levels of sediment may reduce embryo survival, fry emergence and overwinter survival of juveniles.

(Information from: http://www.for.gov.bc.ca/tasb/legsregs/lpc/fpcguide/other/species/species-01.htm#P65_4045).

Current status of management – Currently, there are no specific management strategies in place for the Bulltrout in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.

Dolly Varden (*Salvelinus malma*)

No distribution map is available.

Distribution – Found in fresh and salt water from just south of the Canadian border to at least the Seward Peninsula in Alaska. Their distribution does not extend far inland, but they are found in the Fraser River drainage system. (Information from BC Fish Facts)



Habitat – Freshwater residents may remain in streams or move into lakes. Resident fish can be found in very steep, small streams with slopes well over 20%. (Information from BC Fish Facts)

Current status of management – Currently, there are no specific management strategies in place for the Dolly Varden in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.

Two-colored Sedge (*Carex bicolor*)



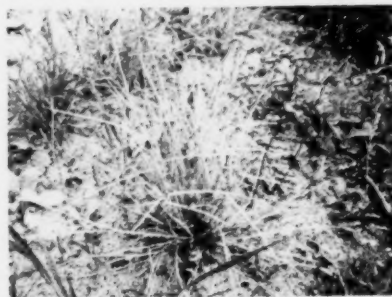
No distribution map is available.

Distribution – Sporadic, mostly north of 58° (MacKinnon et al. 1992).

Habitat – Wet, gravelly sites (gravel bars, lakeshores, stream banks) muskegs, fens, seepage meadows. From low to subalpine elevations throughout the region (MacKinnon et al. 1992).

Current status of management – Currently, there are no specific management strategies in place for the Two-colored Sedge in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.

Many Headed Sedge (*Carex sychnocephala*)



No distribution map is available.

Distribution – From British Columbia to Ontario, southward to Washington, Montana, Colorado, South Dakota, and New York.

Habitat – Occurs on moist or wet ground adjacent to marshes or along lake shores. Some sites are somewhat alkaline. Substrates vary from rather rocky to sandy and silty soils.

Current status of management – Currently, there are no specific management strategies in place for the Many Headed Sedge in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.

Slender Mannagrass (*Glyceria pulchella*)

No distribution map is available.

Distribution – Occurs commonly in Boreal North America. The Columbia Basin region includes the southern limit of its range. (Information from: <http://www.for.gov.bc.ca/hfd/pubs/docs/wp/Wp45/Wp45-1.pdf>)

Habitat – Stream sides, marshes, lakeshores and ponds in the montane zone (BGxh2, BWBS mw1, BWBS mw2, IDF dk3, IDF un, SBS dk, SWB un). Rare in BC east of the Coast-Cascade Mountains. (Information from the BC Conservation Data Center).

Current status of management – Currently, there are no specific management strategies in place for the Slender Mannagrass in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.



Fragrant White Rein Orchid (*Platanthera dilatata* var. *albiflora*)

No distribution map is available.

Distribution – Throughout BC except in the north east, from low to high elevations (Makinnon et al. 1992).

Habitat – Wet meadows, seepage slopes, bogs, stream and lake margins and open forests in the lowland, montane and subalpine zones (CDF mm, ESSF mw, ICH dw, ICH xw, SBS dw1, SBS mh). Rare in southern BC. (Information from the BC Conservation Data Center).



Current status of management – Currently, there are no specific management strategies in place for the Fragrant White Rein Orchid in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.

Elegant Jacob's Ladder (*Polemonium elegans*)

No distribution map is available.

Distribution – Throughout BC at higher elevations.

Habitat – Dry cliffs and scree slopes in the subalpine and alpine zones (AT, ESSF dkp, ESSF dv, ESSF mv1, ESSF xc, ESSF xcp, IDF dw, IDF ww, MS xk, SBS dw3). Rare in southern BC, south of 56°N, mostly in the Coast-Cascade Mountains. (Information from the BC Conservation Data Center).



Current status of management – Currently, there are no specific management strategies in place for Elegant Jacob's Ladder in the management area.

Rivergrass (*Scolochloa festuacea*)

No distribution map is available.

Distribution – Throughout BC; rare in east central, south central and south east BC. Occurs north to Alaska, the Yukon and the North west Territories. (Information from the BC Conservation Data Center).

Habitat – Ponds, marshes, lakeshores, and stream sides in the steppe and montane zones (BG xh2, BG xh3, BG xw1, BWBS mw1, IDF dk1, IDF dk3, IDF dk4, IDF dm2, IDF xh2, IDF xm, PP dh2, SBPS xc, SBS dk). (Information from the BC Conservation Data Center).



Current status of management – Currently, there are no specific management strategies in place for Rivergrass in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.

Plains Butterweed (*Senecio plattensis*)

No distribution map is available.

Distribution – Throughout BC, rare in east central BC. (Information from the BC Conservation Data Center).

Habitat – Dry, open meadows and forests in the steppe and montane zones (BG xh2, BWBS mw1, IDF dk3, IDF dk4, SBPS xc, SBS dh1, SBS dk, SBS dw2, SBS mh). (Information from the BC Conservation Data Center).



Current status of management – Currently, there are no specific management strategies in place for Plains Butterweed in the management area.

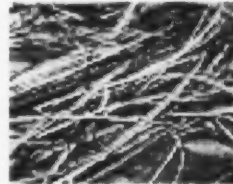
Fernald's False Manna (*Torreyochloa pallida*)

No distribution map is available.

Distribution – Throughout BC, rare in east central BC. (Information from the BC Conservation Data Center).

Habitat – Shallow water, marshes, bogs, and wet meadows in the montane zone (ICH wk3, SBS dk). (Information from the BC Conservation Data Center).

Current status of management – Currently, there are no specific management strategies in place for Fernald's False Manna in the management area. However, riparian management practices are being applied to all forest operations adjacent to water bodies.



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Appendix XI: Sample of PAG Questionnaire and Associated Chart of Responses

Vanderhoof SFM Plan Public Advisory Group Questionnaire

May 11, 2004

Using the following scale of 1-5, please evaluate the Vanderhoof Sustainable Forest Management Plan Public Advisory Group Process.

1 = very poor, 2 = poor, 3 = average, 4 = good, 5 = very good

The PAG Meetings:

1. Provided an agenda in advance?		6. Allocated meeting time wisely?	
2. Involved most members?		7. Summarized decisions?	
3. Showed preparation by the Licensee Team?		8. Focused on consensus decision making?	
4. Followed the PAG Terms of Reference?		9. Had a positive atmosphere?	
5. Updated actions?		10. Your overall score for the meetings	

Comments: _____

The Facilitators:

1. Strived for consensus decision-making?		6. Tolerated and smoothed conflict?	
2. Kept the meetings focused?		7. Obtained technical expertise when needed?	
3. Kept the meetings moving?		8. Captured documentation?	
4. Remained neutral on content issues?		9. Actively listened?	
5. Encouraged open communication?		10. Came prepared and organized?	

Comments: _____

Ratings for Meeting Logistics

1. Village Inn and other locations		3. Meeting room facilities	
2. The PAG meetings' convenience		4. Food and beverages	

Comments: _____

Your Suggestions

Please list three things that the Vanderhoof PAG Licensee Team could improve for future PAG meetings:

1. _____
2. _____
3. _____

General Comments

Please indicate who you are:

☐ PAG Member ☐ Advisor ☐ Observer ☐ Other Name (optional) _____

Vanderhoof PAG Satisfaction Survey Results

